

# **EFFECT OF CONCEPT ATTAINMENT MODEL ON PUPILS ACHIEVEMENT IN SCIENCE**

**A Dissertation**  
**Submitted to Maharshi Dayanad University, Rohtak**  
**in Partial Fulfilment of the Requirement**  
**for the Degree of**  
**MASTER OF EDUCATION (M.Ed)**  
**1987**

**Supervisor :**

**Dr. R. C. HOODA**

**M. Sc (Physics)**

**M. Ed, Ph. D.**

**DEPARTMENT OF EDUCATION**

**Investigator :**

**SANGEETA MALHOTRA**

**B. Sc. (Med.)**

**M. Ed. (Student)**

**MAHARSHI DAYANAND UNIVERSITY ROHTAK**



SUPERVISOR :

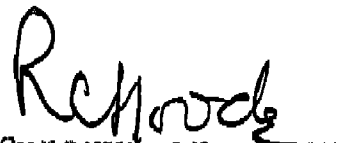
INVESTIGATOR :

Dr. R.C. HOODA  
M.Sc.(Physics) M.Ed., Ph.D.,  
Lecturer,  
Department of Education,  
Maharshi Dayanand University,  
Rohtak (Haryana)

SANGEETA MALHOTRA  
B.Sc (Med.), M.Ed.,  
(Student)

SUPERVISOR'S CERTIFICATE

Certified that Sangeeta Malhotra, has worked for  
her dissertation entitled, "EFFECT OF CONCEPT ATTAINMENT  
MODEL ON PUPILS ACHIEVEMENT IN SCIENCE", under my super-  
vision. Her dissertation is ready and fit for submission.

  
~~SUPERVISOR~~

(Dr. R.C. HOODA)



### ACKNOWLEDGEMENTS

I wish to express my sincere gratitude to my Supervisor Dr. R.C. Hooda, Lecturer, Department of Education, Maharshi Dayanand University, Rohtak, for his effective guidance consisted encouragement and constructive suggestions.

I owe my regards to Dr. J.C. Sharma, Director, Deptt. of Education, M.D. University, Rohtak for providing me necessary facilities.

My heart felt thanks are also due to my teachers Sh. D.K. Chadda and Dr. B.S. Dagaur, for their generous help whenever needed at various stages of this Investigation.

I also acknowledge my debt and warm expression of thanks to the students of Shiva Public School and Vaish Public School, Rohtak, whose co-operation, interest and participation in the work made the study a success.

I feel grateful to Principal of the Schools, Rohtak for providing me all necessary institutional facilities for the smooth conduct of Investigation.

Department of Education,  
M.D. University,  
Rohtak - 124 001.

*Sangeeta Malhotra*  
(SANGEETA MALHOTRA)



# C O N T E N T S

## PAGES

### ACCEPTANCE PAGE

### ACKNOWLEDGEMENTS

#### CHAPTER - I

#### INTRODUCTION

1.1.0	Selected Suggested Measures in the area of Teaching Learning.	2
1.2.0	Information Processing Model of Teaching.	4
1.2.1	Concept and Concept Attainment	6
1.3.1	Conceptwise Classification of Studies.	12
1.3.2	Researches Related to Concept Formation and Concept Attainment.	13
1.3.3	Grades Level (Subjects) Classification of Studies.	14
1.3.4	Variable and Objectivewise Classification of Studies.	16
1.4.0	Statement of the Problem.	25
1.4.1	Objective and Hypothesis of the Study.	25
1.4.2	Hypothesis	25
1.4.3	Key Terms Used.	25
1.5.0	Limitations.	26
1.6.0	Chapterization.	27

#### CHAPTER-II

#### METHOD AND PROCEDURE

2.0.0	Introduction.	29
2.1.0	Design of Study.	29
2.1.1	Theoretical Understanding of RCAM.	30
2.2.0	Studying and Effectiveness of RCAM.	31
2.2.1	Design	32
2.2.2	Population	32





CHAPTER - II

2.2.3	Sample	33
2.2.4	Tools	34
2.2.5	Treatment	36
2.2.6	Statistical Analysis	37

CHAPTER-III

MASTERY OF CAM (CONCEPT  
ATTAINMENT MODEL) AND  
PREPARATION OF MATERIAL.

3.0.0	Introduction.	39
3.1.0	Brief Discription of the CAM	39
3.1.1	Bruner's View about Concept Learning.	40
3.1.2	Objectives of CAM	42
3.1.3	Syntax of CAM	44
3.2.0	Mastery of the CAM	45
3.2.1	Theoretical Understanding of CAM	46
3.3.0	Preparation of Lesson Planning and Tools.	47

CHAPTER -IV

RESULTS AND DISCUSSION

4.0.0	Introduction	51
4.1.0	Results Related to Hypothesis and Conclusions.	52

CHAPTER - V

SUMMARY

5.0.0	Introduction.	58
5.1.0	The Present Study	58
5.2.0	Objective	59
5.3.0	Hypothesis	59



CHAPTER - V

PAGE

5.4.0	Method and Procedure	59
5.4.1	Design of the Study	60
5.4.2	Sample	60
5.4.3	Tools	60
5.4.4	Data Collection	61
5.5.0	Findings	61
5.6.0	Implication	61
5.7.0	Suggestion	63

BIBLIOGRAPHY

64-69

APPENDIX

- A - Lesson plan for concept Attainment Model.
- B - Achievement Test for selected Concepts of Science (ATSCS).

70-89

92-102

.....



\*\*\*\*\*  
CHAPTER - I  
INTRODUCTION  
 \*\*\*\*\*



## INTRODUCTION

There is a popular belief that teaching is emanating from the behaviour of the teacher and it has to be evaluated in terms of learning out comes as teaching and learning are complementary processes. Learning to learn is not just a slogan. It denotes a specific pedagogic approach that teacher must themselves master if they want to match learning experiences to the requirements of the learner. Teaching is an interactive process the formation of which consists of the inter change of ideas, information observations and point of view between a teacher (s) and an individual or individuals and a group called teachers. If the teacher is to adopt and restructure the learning experiences to meet the observations, interests and capabilities of the learner his approach to teaching should be in relation to objectives of teaching should, nature of learner and nature of content. All this requires training for effective teaching as a pre-requisite condition. Therefore training for effective teaching has become a fundamental goal underlying teacher training programme.

Measure of effective teaching strategy is the teaching learning out come which in turn is the function of interaction between the teacher, content and learner,





Here teaching is not talking alone and learning is not listening alone. Teacher and learner must be active in manipulating the system of objects and for organism of interest so that inherent regulation in the experience can be discovered.

#### 1.1.0 SELECTED SUGGESTED MEASURES IN THE AREA OF TEACHING LEARNING

A good deal of discussion has been going on in recent years to revitalize class-room teaching in Indian Schools. The secondary education commission emphasised the need of dynamic methods of teaching. Kothari Education Commission (1964-66) too recommended to improve upon methods of teaching in educational institutions. The N.C.E.R.T. and State Level Bodies like SCERT have also made many efforts to improve upon the competence of teachers as far as methods of teaching are concerned. A few innovations like SITE, Radio-Broad Casting, Correspondence Courses aim at designing suitable instructional design. Recently the UGC has made a few meaningful efforts to focus upon the problem of teaching methodology in Higher Education. A few experiments conducted by Hashangabad Science Teaching Project, Sarabhai Science Community Centre, Gyan Prabodhini Pune etc., are commendable.

The search for good teaching models has agitated Bruce Joyce and Weil Marsha. A model of teaching is a



plan or pattern that can be used to shape curriculum, to design instructional materials and to guide instructions in class room and other setting. These models of teaching have cropped up in all sorts of places. Some have been invented by class room practitioners, others are the work of substantial research in psychology and training. A number of them came from the theorapists and a great many from philosophers.

Joyce and Weil (1980) have described twenty two models of teaching which constitute a basic educational repertoire. These twenty two models have been grouped in to four categories, such as : Information processing Model, Personal Model, Social Interaction Model and Behaviour Modification Model. The sample synoptic view of these four categories is given below in Table 1.1.

TABLE - 1.1                      FAMILIES OF MODELS OF TEACHING

S.No.	CATEGORY OF MODEL	EXAMPLES OF MODEL
1.	Information Process- ing Model.	1. Inquiry Training 2. Concept Attainment 3. Advance Organizer
2.	Personal Model	1. Non-directive Tea- ching. 2. Awareness Training 3. Synectics.



-----		
S.NO.	CATEGORY OF MODEL	EXAMPLES OF MODEL
-----		
3.	Social Interaction Model.	1. Group Investigation 2. Social Inquiry 3. Role Playing.
4.	Behavioural Models	1. Contingency Management 2. Self Control. 3. Assertiveness Training
-----		

#### 1.2.0 INFORMATION PROCESSING MODEL OF TEACHING :

The models of this family share orientation towards the information processing capability of students and ways they can improve their ability to master information. Some information processing models are concerned with the ability of the learner to solve problems, others are concerned with general intellectual ability. A large number emphasize concepts and information development from the academic disciplines. These models are concerned with social relationship and development of integrated and functioning self. The route however, is through intellectual functioning.



### INFORMATION PROCESSING FAMILY AND CAM :

The reactions and attitudes of student-teachers, teacher educators, and administrators are in favour of information processing models of teaching. One of the reason is stated that this family of models is more skin to lecture approach which is very prevalent in all types of Indian Schools.

Out of this family of seven models of teaching the investigator has selected the Concept Attainment Model (CAM) due to the availability of the training package. The training packages of Advance Organiser Model and Inquiry - Training Model are also available. The advance - Organiser model is difficult to understand and execute. Inquiry Training Model does not fit into the present disciplinary framework. Concept Attainment Model fits into disciplinary framework and also falls within the acceptability level.

### 1.2.1 CONCEPT AND CONCEPT ATTAINMENT :

Different types of meaning of concept and concept attainment have been given by eminent - educationists as follows :

#### (a) Concept :

Bruner, Goodnew and Austin "accept the





proposition that concepts are classification or categories and postulate that there are three kinds of concept : Conjunctive, Disjunctive and Relational".

According to Cole and Bruce :

"A concept is a class idea, Chair as a concept, generalizer many specific percepts of that their this one, those other chairs, etc. 'A chair is something to sit upon. A concept becomes a substitute for a thing that is not present, that can not be perceived then and there. The concept ordinarily becomes attached to a symbol, the sound or sight of the word 'Chair'".

According to Russell :

"A concept is a generalization about related data. It is a more-or less stable percept ( a result of a sensory experience). When a child has learned to distinguish cats from other animals, whether the cats be large or small, black, white, grey, ginger or tortoise coloured, he applies the word cat to the class of ideas and uses a concept".

According to Mc Donald :

"A concept is a classification of stimuli that have common characteristics".



(b) Concept Attainment :

Russell notes that "the adult does not - typically acquire new concepts so much as he learns new variation and heirarchies". The processes involved in concept formation are not closed to the adult, because vast number of concepts are formed, by the time adulthood is reached, now concepts are merely less likely to occur.

The method of acquiring concept in adulthood has been referred by Bruner and his associates as concept attainment. "Attainment refers to the process of finding predictive defining attributes that - distinguish examples from non-examples of the class one seeks to discriminate."

According to Encyclopedia of Educational Research  
concept attainment strategy :-

The concept attainment (CA ) strategy is concerned with two separate but related ideas: the nature of concepts themselves and the thinking process used by individuals to learn concepts.

All concepts possess at least four components attributes, example, definition and heirarchical - relation.



The present study has primarily focussed on concept attainment, therefore, studies related to concept attainment have been given more prominence.

#### CONCEPTWISE CLASSIFICATION OF STUDIES :

##### SIOKAN (1981):

In the study an evaluation of pre-service teacher concept training strategy had developed, concept teaching strategy for training preservice teachers in teaching concept. Two concept teaching strategies were developed. First one was concept attainment strategy, second one was concept relationship strategy.

##### CLANCE (1980):

Clance (1980) has studied the effect of positive and negative instances in teaching Mathematics Concept.

##### PRAPVADE (1980):

Prapvade (1980) has studied the use of prototype and skill development instructional presentation forms in acquisition of Mathematical Concept a regular - polygon.

##### SHIRLUG (1980) :

The main objective of his study was, the effect of negative instances in identification of activity concept.



ANTHONY (1980):

Had studied the acquisition of 'higher order test administration skills utilizing concept based training strategy. The main focus of the study was to know how would concept based training method will help in acquisition of higher order test administration - skills.

HOVDEN (1980) :

Hovden (1980) had examined level of concept-attainment of mathematics concept of "variable" by college students.

TENNER (1980) :

The study entitle student mastery of classificational concepts in Zoology course. In this study he tries to determines whether or not presentation in lab of definition example and non-example or salient defining attributes of Zoology concepts would enhance concept attainment.

JOSEPH (1980) :

In this study, the attainment of Mathematical set theory concepts were studied. These concepts were attained by those subjects having field development/global cognitive styles. The concepts - were presented in written format





employing three different instructional strategies  
(a) Deductive (b) Inductive and (c) Cued Inductive.

ENNETH (1981) :

The investigator had studied the effect of feed-back and prompting on learning some psychological concepts from concept programmed material.

From the above review, one can make out that there is only one study (Tenner 1980) where science concept attainment had been studied.

GRADE LEVEL (OF SUBJECTS) CLASSIFICATION OF STUDIES :

Here various studies of concept attainment are grouped according to grade or age level of subject which formed the sample of the studies.

SIOKAN (1980) :

Siokan (1980) had conducted a study on - pre-service teachers under the title "An evaluation of preservice teacher concept training strategy".

ETTAYEB (1981) :

In this study entitled 'The effects of pictorial representation on concept learning'. The subject were Sixth Grade Childrens 11 to 12 years old.



CLANCE (1980) :

Clance (1980) had conducted a study entitled the effect of negative and positive instances in teaching mathematical concepts to freshman at Florida. The subjects for this study are Freshmans of College.

PRAPVADEE (1980) :

In his dissertation entitled - 'Acquisition of a mathematical concept by children using prototype and skill development instructional presentation forms ' This study was conducted on third grade children.

SHIRLEY (1980) :

Shirley (1980) had conducted a study on seven, eleven, fifteen years old children under the title. The use of negative instances in Indentification of Activity Concepts.

HOVDEN (1980) :

The title of this dissertation was measurement of the levels of attainment by college - mathematics students of the concept "variable". The subjects were college students.

JAMES(1979) :

James (1979) had conducted a study entitled 'The effect of instructions and practice on concept-identification. 'The subjects were college students from introductory psychology courses.



TENNER (1980) :

In this dissertation entitled - 'student mastery of classificational concepts in introductory college Zoology'. The subjects were college students studying Zoology.

JOSEPH (1980) :

Joseph (1980) had conducted a study entitled - 'The interactive effects of global cognitive style and general mental ability with three instructional strategies on a mathematical concept task. The subjects were sixth grade children.

BENNETH (1980) :

Benneth (1980) had conducted a study of students learning Introductory Psychology course. The title of this study was promoting and feed-back variable in the concept of programming.

Most of the above mentioned studies have reflected that the subjects were mostly from College level, a few studies were conducted on primary grade children.

### 1.3.3 VARIABLE AND OBJECTIVEWISE CLASSIFICATION OF STUDIES :

All studies related to concept attainment were classified according to objectives, variables and finding.

An overview of this classification is given in the following Table.



The analytical approach which has been adopted for reviewing these studies help a lot in finding out the explored areas and gap areas in concept attainment field. The following observations emerged after this analysis :

- a) Treatment provided for concept attainment are of various types. It ranges from pictorial representation to self instructional materials. It is also noticed that concept attainment strategy was combined with other types of variables. Two types of presentation forms for concept learning were provided. One of them was based on CA strategy and the other was expository or inquisitory from only. Effect of Positive and Negative instances on concept learning was combined with change of attitude of student towards mathematical concept. CA strategy was combined with concept relationship. Three different types of strategies for concept teaching were developed. There are : Inductive, Deductive and Cued Inductive Strategy. Their individual effects as well as interactive effect on were studied.

From these treatment, it was not clear whether Reception type or selection type or unorganized type of strategies were followed.





- (b) Dependent measures were also of various types. It is observed that most of the dependent measures were in the form of scores on criterion test such as, scores on the test for measuring concept teaching proficiency, scores on concept attainment developed from Klausmeir (1968) model; and scores on similarities test, and Gestalt completion test for measuring cognitive style; scores on Post test and retention test measuring for mathematical concepts. A few other dependent measures were different from scores on criterion test. Such as number of instances needed to identify the concept, accuracy and consistency of naming a concept, students errors in classifying a novel concept. There are certain other dependent measures related to other variable such as attitude scores, cognitive style measuring scores etc.
- (c) Finding of these studies also varying in trends. Some of the studies indicate Positive results that is, treatment had produced significant effect, concept attainment. For example Clance (1980) reported that the use of Positive & Negative instances have significant effect in CA than the use of Positive instances alone. Attitudes of student towards mathematics had also been changed



after the treatment of concept based training strategy. Prapradee( 1980) found that concept learning was facilitated by the presentation of best examples than by the presentation of a list of critical attribute.

The five studies mentioned above indicate-negative results, that the treatment did not produce significant effect on concept learning. Gregorg(1981) had observed that the proficiency in concept teaching was not acquired by preservice teacher who were trained through concept based training strategy. Tunner(1980) found that presentation of definition example and non example did not have significant effect on concept training.

From the above discussion, the following points emerged:

- a) Attainment of science concept were negligibly studied.
- b) Sample used for these studies were mostly from college level.
- c) Findings of studies did not indicate a definite direction. In other words, we can say that it is not clear whether or not concept attainment - strategy can produce significant effect.



- d) It is also not clear whether these studies were conducted following the guidelines by - Joyce and Weil (1930)

Keeping all these points in the mind there is need to conduct a study to test the attainment of Science concept by Middle School children. The present study is a step in this direction.

#### 1.4.0 STATEMENT OF THE PROBLEM

'Effect of concept attainment Model on pupil achievement in Science'

#### 1.4.1 OBJECTIVES AND HYPOTHESIS OF THE STUDY:

To find out the effect of concept attainment model on the Pupil achievement in Science.

#### 1.4.2 HYPOTHESIS:

On the basis of above objective the following hypothesis was formulated:

There will be no significant difference between the mean achievement scores of the science student taught through the concept attainment model vis-a-vis traditional method.

#### 1.4.3 KEY TERMS USED:

##### (1) CONCEPT:

According to dictionary by Good 'An idea or representation of a common element or attribute by which groups or classes may be distinguished.'



(ii) CONCEPT ATTAINMENT(CA):-

The CA strategy is concerned with two separate but related ideas: The nature of concept themselves and the thinking processes used by individual to learn concepts.

iii) MODEL:

A pattern or plan, which can be used to shape a curriculum or course, to select Instructional Material and to guide actions of the teachers.

iv) EFFECTIVENESS:

Use of a plan for instruction or presentation which causes a desired change in the learner's behaviour.

(v) REACTION:

Response to a stimulus, any method and - emotional state brought about by a situation.

vi) ACHIEVEMENT:

The status of a pupil with respect to attained skills or knowledge as compared with other pupils or with the adopted standards of schools.

1.5.0 LIMITATIONS:

- i) There were three variations of concept attainment model. Out of these three, only Reception concept Attainment was used for studying the effectiveness of model.
- ii) There were three types of concepts as described by G.S. Bruner; in this study only the conjunctive -





concepts were considered.

- iii) There were many conjunctive concepts in the science books of Middle standard; out of these only Eight concepts were taught through GAM (Concept Attainment Model).
- iv) Out of several criteria for testing the effectiveness of model; only one criteria, namely, Achievement Test for Selected Concepts of Science Chemistry (ATSC) was taken.

#### 1.6.0 CHAPTERIZATION:

##### CHAPTER - I : INTRODUCTION:

This study has been introduced in this chapter.

The need of new method of teaching and training has been highlighted.

##### CHAPTER - II: METHOD AND PROCEDURE:

It describes the experiment, procedure, sample, materials, tools and statistical techniques used to analyse and interpret the data.

##### CHAPTER - III : MASTERY OF CAM AND PREPARATION OF MATERIAL:

It describes the preparational aspect of the study. This preparation can be divided in two part, first is Mastery over the Model and second is - preparation of the tools.



#### CHAPTER - IV : RESULT AND DISCUSSION :

It gives analysis, interpretation and discussion of data. Results are presented in this chapter.

#### CHAPTER - V : SUMMARY :

It gives the summary and conclusion of the study and also gives suggestion for further research.

\*\*\*\*\*



\*\*\*\*\*  
\*\*\*\*\*  
\*\*\*\*\*  
\*\*\*\*\*  
\*\*\*\*\*  
CHAPTER - II\*\*\*\*\*  
\*\*\*\*\*  
METHOD & PROCEDURE\*\*\*\*\*  
\*\*\*\*\*



## 2.00 INTRODUCTION :

The present study is related with Reception concept attainment model (RCAM). The main aim was to know the effectiveness of the Concept Attainment Model. The effectiveness of the Concept Attainment Model was judged on the basis of achievement score of the students which they secured on the achievement test.

The design of the study has been given in Table 2.1.

TABLE 2.1

### DESIGN OF THE STUDY

---

2.1.0	Mastery of Model	2.2.0	Studying the effectiveness of the CAM.
2.1.1	Theoretical Understanding.	2.2.1	Design
2.1.2	Develop lesson Plan according to LPG	2.2.2	Sample
2.1.3	Population	2.2.3	Tools
2.1.4	Treatment	2.2.4	Statistical Analysis.

---





### 2.1.1 THEORETICAL UNDERSTANDING OF RCAM :

There are three phases of RCAM. In each phase of the model are different types of teaching. A thorough knowledge of all these activities in the phases contributes to the theoretical understanding of this model.

The discription of these phases and their activities are give in Table 2.2.

TABLE - 2.2.

PHASES	ACTIVITIES
<u>Phase One :</u>	
presentation of Data and Identification of the concept.	1. Present labelled examples 2. Compare attributes in Positive and Negative Examples. 3. Generate and test hypothesis. 4. Name the concept. 5. State and definition according to the essential attributes.
<u>Phase Two :</u>	
Testing attainment of the concept.	Identify additional unlabelled examples as 'YES' or 'NO' Generate examples.
<u>Phase Three :</u>	
Analysis of thinking strategies.	Describe thoughts Discuss role of hypothesis and attributes.



PHASES	ACTIVITIES
	Discuss type and number of the hypothesis.
	Evaluated the strategies.

when the investigator became well acquainted with the theoretical phase of the Model, investigator tried continued to learn the practical phase.

#### 2.2.0 STUDYING THE EFFECTIVENESS OF RCAM :

The present study intends to find out the effectiveness of RCAM in terms of achievement scores of students of middle grade levels. For this purpose, a simple Post Test Parallel Group Design was employed. The two groups, namely, the experimental group and the control group were formulated in such a way that the two groups belonged to two independent setting. In other words the experimental group was picked up from one school and the control groups was picked up from the other school. The treatment was assigned randomly.

a) Experimental Group : This group was given the treatment in the form of Reception Concept Attainment Model (RCAM) by the investigator.



- (b) Control Group : This group was taught the same concepts by traditional method. In other words, this group was not given the treatment.

After the completion of the treatment the experimental group and the control group were given Achievement Test.

### 2.2.1 DESIGN :

This design is being placed below diagrammatically:-

$G_1$	<table><tr><td>X</td><td><math>O_1</math></td></tr></table>	X	$O_1$	Ex. Group
X	$O_1$			
$G_2$	<table><tr><td>X</td><td><math>O_2</math></td></tr></table>	X	$O_2$	Cont.Group
X	$O_2$			

Where : X = Treatment

$O_1$  = Post Test Observation of experimental Group.

$O_2$  = Post Test observation of control group

$G_1$  = Experimental Group

$G_2$  = Control Group.

### 2.2.2 POPULATION :

The population of the study was all Hindi Medium students of Middle grade studying in average socio-economic schools of Rohtak City, during the session 1986-87.



These schools ought to be morning shift schools so that investigator could also attend to her regular studies in the department while keeping the objectives of the study in mind, the researcher choose Middle grade population on account of the following reasons.

- (a) Reception concept attainment model (RCAM) is the first and the foremost model in the heirarchy of concept attainment model (CAM) and this model is suitable for younger pupils. Therefore, investigator chose to conduct the study for Middle class students.
- (b) New Method of teaching are easily applicable to children possessing flexible attitudes.

### 2.2.3. SAMPLE :

The population for the present study represents students of Middle Class of average schools of Rohtak city. Out of these schools, two schools were selected to form the sample. The selection of these schools was made on the basis of the judgement of the investigator e.g. Investigator chose those schools which are nearer to her home and time of the schools was suited to her. These schools were :

- 1. Shiva Public School (SPS), Rohtak.
- 2. Vaish Public School (VPS), Rohtak.





Agewise and Schoolwise distribution of pupils in experimental and control group is given in Table 2.4.

TABLE 2.4.      "AGEWISE & SCHOOLWISE DISTRIBUTION  
IN THE SCIENCE "

AGE GROUP	SHIVA PUBLIC SCHOOL	VAISH PUBLIC SCHOOL	TOTAL
13 - 14	24	18	42
14 - 15	16	12	28
T O T A L	40	30	70

#### 2.2.4. TOOLS :

The following tools namely, The achievement test for selected concepts of science (Chemistry (ATSCS) was used for the measurement of dependent variable.

#### Achievement Test for Selected Concepts of Science:

The investigator prepared (ATSCS) teacher made achievement test in which there were 40 items representing all the concepts taught to pupils. 40 minutes time was fixed for completing the test. The test was administered to the students and scoring of marks was given in such a way that one mark was allotted to each correct item.



Instructions given in the Achievement Test for selected concepts of science (ATSCS) clarifies the method of solving the questions. Besides this, a demonstration question was also given as a sample, so that pupils may easily solve the item correctly.

Distribution of items according to the concepts is given in Table 2.5.

TABLE 2.5.      "DISTRIBUTION OF ITEMS ACCORDING  
TO THE EIGHT CONCEPTS"

Sl. No.	Concept	Nature of Item		Total Item.
		Multiple Choice	Short Answer	
1	2	3	4	5
1.	<u>ACIDS</u> :			
	a) Definition	6	-	6
	b) Identification			
2.	NITRIC ACID & ITS PROPERTIES (Physical & Chemical)	4	2	6
3.	SULPHURIC ACID & ITS PROPERTIES.	6	-	6
4.	HYDROCHLORIC ACID AND ITS PROPERTIES.	5	-	5
5.	<u>BASES</u> :			
	a) Definition	5	-	5
	b) Identification			
6.	CALCIUM HYDROXIDE & ITS PROPERTIES.	3	-	3
7.	SODIUM HYDROXIDE	4	-	4
8.	SALT AND THEIR TYPES	5	-	5
T O T A L		38	2	40



From the above distribution of items, it is clear that there are at least three items for each concept and the nature of item was decided according to the instructional objectives of the lesson.

#### TREATMENT :

The nine concepts selected by the Investigator were taught to the experimental group through various phases of the Reception Concept Attainment Model and to the control group by the traditional method. Lesson were taught in the schools period prepared the lesson plans according the guide lines of Plannig Guide provided by Weil Marsh and Bruce Joyce. The following three phases of the concept attainment models are followed by the Investigater for teaching the experimental group.

#### ----- PHASES

#### ACTIVITIES -----

##### Phase One :

Presentation of  
Data and identifi-  
cation of the  
concept.

1. Present labelled examples.
2. Compare attributes in positive and Negative examples.
3. Generate and test Hypothesis
4. Name the concept.
5. State and definition according to the essential attributes.

---

##### Phase Two :

Testing Attainment  
of the Concept.

1. Identify additional unlabelled examples as 'YES' or 'NO'
  2. Generate examples
-



---

 PHASES

 ACTIVITIES
 

---

<u>Phase Three :</u>	1. Describe thoughts.
Analysis of	2. Discuss role of hypothesis
thinking	and attributes.
strategies.	3. Discuss type and number of
	hypotheses.
	4. Evaluate the strategies.

---

So keeping in mind all these objectives of three phases the actual lessons were prepared and given to the pupils.

In the last achievement test, for selected concepts of Science ( ATSCS) was administered to assess the understanding of pupils about the Model.

#### STATISTICAL ANALYSIS :

Statistic has become indispensable tool for research. It is fundamental to the proper analysis of data and investigation of a complex phenomenon.

Statistical Analysis was used for achieving the following objective of the study to find out the effect of concept Attainment Model on pupils achievement in science. To fulfil the above objective the main statistical techniques employed are briefly described below :-





't-test' :

The effectiveness of Reception Concept Attainment Model (RCAM) was studied by calculating the significance of difference between the mean scores of achievement test, administered on the experimental and control group, for small independent samples this test has been defined in terms of the following formula :

$$t = \frac{M_1 - M_2}{SE_D}$$

$$SE_D = SD \sqrt{\frac{1}{N_1} + \frac{1}{N_2}}$$

$$SD = \sqrt{\frac{E(X_1 - M_1)^2 + E(X_2 - M_2)^2}{(N_1 - 1) + (N_2 - 1)}}$$

Where  $M_1$  = The mean of Group - I

$M_2$  = The mean of Group - II

$E(X_1 - M_1)^2 = x_1^2$  is the sum of the square deviation around the mean of group - I

$E(X_2 - M_2)^2 = x_2^2$  is the sum of the square deviation around the mean of Group-II.

\*\*\*\*\*  
\*\*\*\*\*  
\*\*\*\*\*



\*\*\*\*\*  
CHAPTER - III  
MASTERY OF CAM AND PREPARATION  
OF MATERIAL  
\*\*\*\*\*



MASTERY OF CONCEPT ATTAINMENT MODEL(CAM) AND  
PREPARATION OF MATERIAL.

3.0.0 INTRODUCTION:

This chapter is devoted to the preparational aspect of the study. The concept attainment model form the main treatment, whose effectiveness is being tested in this inquiry. In order to test the effectiveness of the Model, prior preparations have been made by the investigator. These preparation were:- (a) Acquire the Mastery of CAM (b) Preparation of lesson plan and(c) preparation of Tools.

3.1.0 BRIEF DISCRPTION OF THE CAM:

Concept attainment model was designed by Bruce Joyce and Weil Marsha on the basis of the work of J.S.Bruner. It is meant for teaching different levels and types of concepts. The CAM facilitates the conceptual type of learning in contrast with rote learning. There are three variations of CAM, the first one is Reception CAM which is more direct in teaching students the elements of a concept. A second variation is the selection CAM which permits students to apply the conceptual activity more actively by using their own initiation



and control. The third variation is unorganized CAM, where the learner- transfers concept theory and attainment activity to a real life setting.

### 3.1.1 BRUNER'S VIEW ABOUT CONCEPT LEARNING:

Bruner has described the processes by which people acquire concept on the basis of researches in his book 'A STUDY OF THINKING '. All types of concept learning depends upon nature of concepts which Bruner has given as 'Theory of Concept' and also described the thinking strategies used by learners in order to acquire concepts.

#### (1) THEORY OF CONCEPT :-

Bruner sees any concept as having five elements:

- (a) Name (b) Example (Positive, Negative). -
- (c) Attribute (essential and non essential )
- (d) Attribute value and (e) Rule.

#### NAME :-

The name is a term given to a category, for example, fruit, plant and chair are all names given to a category.

#### EXAMPLE :-

The second element 'Example' referred to instances of a given concept. Those instances which possess a concept are called positive examples and those instances which do not possess the concept are called Negative examples.





### ATTRIBUTE AND ATTRIBUTE VALUE:

Third and fourth elements of the theory of concepts are attribute and attribute value. Attributes are the common characteristics that cause to place example in the same category.

Bruner differentiated attributes of the concept in the following types :-

Those attributes are essential ones which play a role in distinguishing examples from non examples. The attributes that are often associated with the concept but does not play a role in distinguishing examples from non-examples are called non-essential attributes.

The acceptable value range of an essential attribute of concept is called attribute value. For example, purple is out of the acceptable value range of colour for 'apples'. There are of course, certain concept whose attributes does not have a range of values.

The distinguishing attribute and their unique value range are called criterial attribute. If creterial attribute is missing from an object then the given object is an example of a different concept. These non-essential attribute in the examples which create difficulty in finding out the common essential attributes of concept are called Noisy attributes.



RULE :-

The sixth important element of a concept is a rule. It is a definition or statement specifying the essential attribute of a concept. A Rule normally evolves at the end of the concept attainment process.

3.1.2 (b) OBJECTIVES OF CAM :-

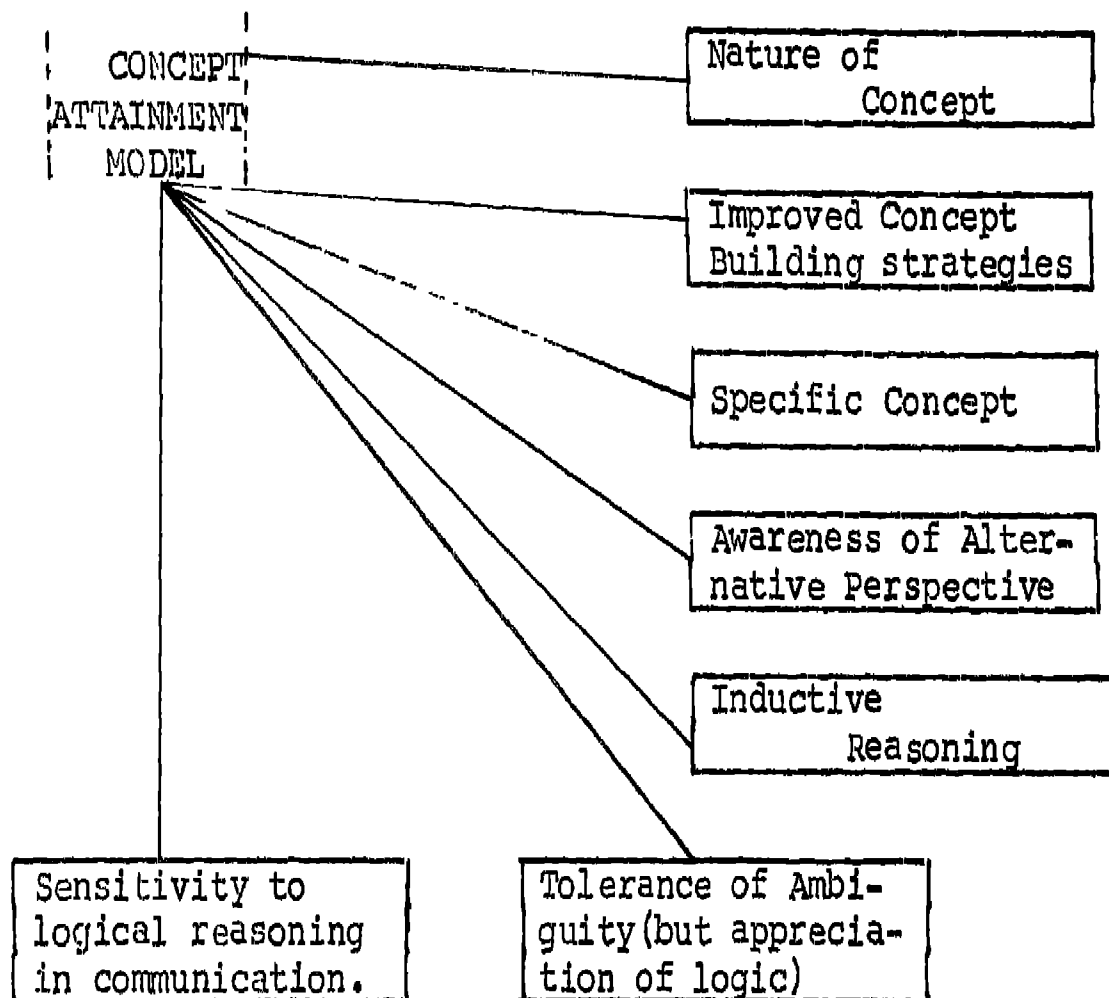
The CAM produces two types of effects; the instructional effects and nurturing effects. The major instructional objectives of CAM are : (a) to teach specific concept, (b) to understand the nature of concept, (c) to create awareness about thinking strategy and improve concept building strategies (d) to provide practice in inductive reasoning.

With abstract type of concept certain nurturing effects are also produced by the model. These are : (a) an awareness of alternative perspectives, (b) a sensitivity to logical reasoning in communication and (c) tolerance of ambiguity.



TABLE - 3.1     DIAGRAMMATICAL REPRESENTATION FOR OBJECTIVES OF CAM.

\_\_\_\_\_ Instructional  
 ----- Nurturant





### 3.1.3 (C) SYNTAX OF CAM :

The syntax of the model describes the model in action, it describes the sequence of the activities (Phases) which teachers have to do by using the model. Syntax of Reception concept attainment model as follows:-

#### 1. PHASE ONE : Presentation of Data and Identification of Concept.

It involves presenting data to the learner each unit of data is a separate example or non-example of the concept.

The examples are presented in a pre-arranged order and labelled 'YES' or 'NO'. The learners are informed that there is an idea or concept that all the positive examples have in common; learners are asked to compare and justify the attributes of the different example. Their task is to develop a hypotheses about the concept.

#### 2. PHASE TWO : Testing Attainment of Concept :

The students test their attainment of the concept, first by correctly identifying additional unlabelled examples of the concept and their by generating their own examplers.

#### 3. PHASE THREE: The Analysis of Thinking Strategies :

In this phase students begin to analyse the strategies by which they attain concept. The learners





can describe their patterns, whether they focused on attribute or concept; whether they did so one at a time or several at once; and what happened when their hypothesis was not confirmed. Did they change strategies ? Gradually, they can compare the effectiveness of different strategies.

### 3.2.0 MASTERY OF THE CAM :

In order to acquire mastery of the CAM, the investigator had followed training strategy as developed by Bruce Joyce and Weil Marsha. This trading strategy comprises of four components :

- a) Describing and understanding the Model.
- b) Viewing the model.
- c) Planning of Lessons.
- d) Adopting the Model.

Out of these four components, fourth one was not included as a part of the training taken by the investigator; because it concerned with the reformulation of curriculum according to the Model. The first three components of training strategy can be grouped into two main classes.

- a) Theoretical understanding of the CAM
- b) Application of theory in Practice.



### 3.2.1 THEORETICAL UNDERSTANDING OF THE CAM :

Prior to actual preparation of lesson plans according to CAM, the investigator had thoroughly read the theoretical part of the model. The main steps required for theoretical understanding were :

- a) To understand Bruner's view about concept learning.
- b) To know instructional goal of the CAM.
- c) To learn the syntax of the model.
- d) To evaluate understanding about CAM.

First part of the training strategy is understanding the model and related concepts. Those specific related terms are : Theory and Overview, Goals and Assumptions, Categorizing, Concept Formation and Concept Attainment, Theory of concepts, Analysing thinking strategies for attaining concepts, Concept attainment as a Model of Teaching. The Teacher's Role, Taking theory into action, Elements of a concept, types of concepts and Distinguishing concepts from other types of content.

#### Preparation of Lesson Plans :

The investigator had taught Vth standard students through CAM. For this, investigator had prepared lessons plans exactly on the lines of lesson plan guide (LPG) available in the package prepared by



Weil Marsha and Bruce Jyoce (1978). The broad outline of this lesson plan guide (LPG), are as follows :

1. Analysis of Concept
2. Name of the concept
3. Essential attributes
4. Non-Essential attributes
5. State the rule
6. Type of concept
7. Behavioural objectives
8. Describe 'YES' examples
9. Describe 'NO' example
10. Presentation
11. Phases of the Model
12. Questions that will elicit response from student.

The topics for the lesson plans were selected from the Middle standard science book. The overview of the eight lesson plan is given as under :-

TABLE 3.2 : The Overview of the Lesson Plan

S.No.	CONCEPT	SELECTED EXAMPLES		DURATION
		POSITIVE EXAMPLE	NEGATIVE EXAMPLE	
1	2	3	4	5
-----				



1	2	3	4	5
1. Acids :				
a) Definition	1. Different type of Acids.	1. Water		35 Minutes.
b) Identification	2. Orange	2. Different type of Bases.		
	3. Grapes	3. Banana.		
2. Hydrochloric Acid and its Properties.	1. Water	1. Methane		35 Minutes.
	2. Chloroform	2. Methane Chloride		
	3. Ammonium Chloride.	3. Sodium Hydroxide		
		4. Calcium Carbonate		
3. Sulphuric Acid and its Properties	1. Gypsum	1. Water		35 Minutes.
	2. Oleum	2. Ammonium Bi Carbonate		
	3. Copper Sulphate	3. Hydrochloric Acid.		
4. Nitric Acid and its Properties	1. Plastic	1. Citric Acid		35 Minutes.
	2. Nitrous Acid	2. Calcium Carbonate		
	3. Manure	3. Ammonium Chloride.		
5. Base	1. Calcium Hydroxide	1. Potash Alum		35 Minutes.
	2. Potassium Hydroxide	2. Baking Powder		
	3. Sodium Hydroxide	3. Washing Soda		





1	2	3	4	5
6.	Sodium Hydroxide & its properties	1. Air 2. Soap 3. Plastic	1. Sulphuric Acid 2. Potash Alum 3. Common Salt	35 Minutes
7.	Calcium hydroxide & its properties	1. Calcium Carbonate 2. Air.	1. Plastic 2. Soap 3. Acids	35 Minutes
8.	Salts	1. NaCl 2. Washing Soda 3. Potassium Nitrate	1. Acids 2. Bases 3. Gases.	35 Minutes



### 3.3.0 (d) Preparation of Tools :

One tool, namely Attainment Test for Selected Concept of Science (ATSC) is used.

#### 3.3.1 ATTAINMENT TEST FOR SELECTED CONCEPTS OF SCIENCE (CHEMISTRY) (ATSC) :

It consisted of forty items of which 38 are multiple choice type and two are short answer type of items. The first draft of this achievement test comprises of forty multiple choice type of items. This draft was administered to six students studying in Middle standard of different schools other than the sampled schools. On the basis of experience from the responses of these students, two items were converted to short answer type of items. The content validity of the test were worked out by consulting teachers of the sampled school. The reliability of the test could not be worked out due to shortage of time.



\*\*\*\*\*

CHAPTER - IV

RESULTS ----- & DISCUSSION

\*\*\*\*\*



#### 4.0.0. INTRODUCTION :

This chapter is devoted to the results obtained by administering Achievement Test (Attainment Test for selected concepts of Science i.e. Chemistry) to the Experimental and control groups. The results are given in accordance to the objective and hypothesis of the study. The hypothesis is :

There will be no significant difference between the mean achievement scores of the science students taught through the CAM vis-a-vis-Traditional Method.

#### 4.1.0. RESULTS RELATED TO HYPOTHESIS :

As described in chapter II the first objective of the study is, to find out the effectiveness of RCAM in terms of concept attainment of students. According to this objective the ATSC was administered to Experimental and Control Groups. The ATSC is comprised of forty items having thirty eight multiple choice and two short answer type.

The itemwise number of correct responses and their percentage are given in Table - 4.1.

---





TABLE - 4.1 : ITEMWISE NUMBER OF CORRECT RESPONSES AND THEIR PERCENTAGE FOR THE EXPERIMENTAL AND CONTROL GROUPS.

ITEM NO	EXPERIMENTAL GROUPS (N = 40)		CONTROL GROUPS (N = 30)	
	NUMBER OF CORRECT RESPONSE	PERCENTAGE OF CORRECT RESPONSE	NUMBER OF CORRECT RESPONSE	PERCENTAGE OF CORRECT RESPONSE
1	2	3	4	5
1	35	87.5	2	6.66
2	25	62.5	5	16.60
3	11	27.5	5	16.60
4	17	42.5	4	13.33
5	40	100	8	26.60
6	29	72.5	6	20.00
7.	11	27.5	5	16.60
8	16	40.0	5	16.66
9	35	87.5	1	3.33
10	16	40.0	5	16.66
11	38	95.0	4	13.33
12	29	72.5	4	13.33
13	16	40.0	2	6.66
14	8	20.0	4	13.66
15	20	50.0	1	3.66
16	28	70.0	4	13.66
17	12	30.0	5	16.66
18	21	52.5	10	33.33
19	10	25.0	0	0.00
20	13	32.5	0	0.00
21	11	27.5	2	6.66
22	28	70.5	5	16.66
23	17	42.5	2	6.66
24	11	27.5	3	10.00
25	14	35.0	2	6.66
26	14	35.0	2	6.66
27	28	70.0	5	16.66
28	34	85.0	0	0.00

Contd.....



1	2	3	4	5
29	21	52.5	0	0.00
30	16	40.0	2	6.66
31	25	62.5	0	0.00
32	19	47.5	0	0.00
33	25	62.5	3	10.00
34	15	37.5	3	10.00
35	12	30.0	4	13.66
36	28	70.0	0	0.00
37	19	47.0	0	0.00
38	23	57.5	1	3.66
39	27	67.5	1	3.66
40	28	70.0	0	0.00

Range :	8 to 40	Percentage	Range :	0 to 10	Percentage
Mean :	22.67	of	Mean :	3.73	of
S.D. :	5.57	Range :	S.D. :	2.95	Range :
N :	40	20 to 100%	N :	30	0 to 33.33%

The Table 4.1 gives information about the level of attainment of experimental and control groups. The scores of the Experimental group on Attainment Test for selected concepts of Science (Chemistry) (ATSC) ranges from nine to forty and that of Control Group from zero to ten. It is also noticed that the Mean attainment of experimental group is 22.67 and that of Control Group is 3.73. The significance of difference between these means have been worked out and the results are presented later in this caption.



If the correct scores and their percentages are analysed in terms of various elements of concept, the following observation and conclusion can be drawn :

1. Item No. 5, 3, 6, 7, 9, 13, 17, 25, 29, 31, 36, 40 measure essential attributes. That is the correct scores and their percentage on these items indicate about the understanding of the essential attributes of concepts. Out of these twelve items, 70% of pupils answered correctly on seven items, while on rest of the five items 30 to 50% of pupils answered correctly. Keeping 70% attainment as Mastery Level, one can conclude that pupils acquire mastery level on 58% of the concepts measured in these items. It also means all pupils could not understand the essential attributes of the concepts.

2. Item No. 7, 8, 4, 14, 19, 26, 30 and 35 assess non-essential attribute. The scores and their percentage on these items indicate about the understanding of pupils, the term 'non essential attribute'. On all eight items, pupil scores ranges from 20 per cent to 42 per cent. Keeping 70 per cent attainment as mastery level, one can conclude that pupils could not acquire mastery on any one item. It mean pupils not understood the term 'non essential attribute'.



3. Item number 10, 12, 16, 21, 27, 31 and 39 assess the understanding of pupils about 'positive example'. Out of these eight items on five items 70 percent of pupils answered correctly. On rest of three items, their percentage ranges from 28 percent to 62 percent. So one can say that pupils acquire mastery level on 64 per cent of items which is quite close to 70 percent, mastery level. It means pupils understand the term 'positive example'.

4. Item number 15, 20, 23, 24, 25, 33, 35, 37, 38- the test understanding of pupils about 'negative example'. The percentage of pupils correct answer on these nine items ranges from 30 per cent to 57 per cent. Keeping 70 per cent attainment as mastery level, one can conclude that pupils could not acquire mastery on these items. It means pupils feel difficulty in differentiating non-examples from examples.

5. Items number 2 and 18 assess the defining ability of pupils in terms of essential attribute. Pupils could not acquire mastery.

From this observation one can conclude that pupils acquire mastery only on two were elements of concept, namely, positive example and essential attribute. According to J.S. Bruner identification of non-essential attribute, from negative example is quite difficult





and it is second level of conceptual understanding. Since in the present study pupils were exposed to treatment for a short time, it was not possible for them to attain second level understanding. It means that of the treatment is increased more examples can be given the second level of conceptual learning also takes place.

From this table, it is also noticed that in case of most of the test items, the experimental group produced higher percentage of correct response than the control group. It is also observed that even 20 per cent of control group pupils could not answered correctly on any one item. Keeping this in view it may be said that CAM was more effective than traditional teaching for teaching science concept to VII<sup>th</sup> grade-children.

TABLE - 4.2 : SIGNIFICANCE OF DIFFERENCE BETWEEN  
MEAN SCORES ON THE ATSC FOR THE  
EXPERIMENTAL AND CONTROL GROUPS.

MEAN	S.D.	N	SEM	SED	t	df
22.67	5.57	40	0.88	0.69	22.57	68
3.73	2.95	30				

Table 4.2 shows that the mean performance of the experimental group is 22.67, whereas the Control group has attained a mean scores of 3.73. The 't' value between



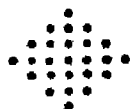
the mean is significant at 0.01 level. Further the over all mean performance on the ATSC of the experimental group is significantly higher than that of the control group. It may be said that treatment CAM was much more effective in the attainment of science concept for Middle Grade children.

#### 4.3.0 CONCLUSIONS :

On the basis of results and the following conclusion are drawn. These conclusions are generalizable to the extent of the representativeness of the sample and the accuracy of methodology employed in the study. The main conclusion is presented here in accordance with the hypothesis of the study.

#### THE HYPOTHESIS :

"There will be no significant difference between the mean achievement scores of the science student taught through the concept Attainment Model (CAM) vis-a-vis iraditional Method". So to test the tentability of this hypothesis means, SDs and 't' value are worked out to test the significance of mean differences the 't' value is significant at .01 level. Thus we can say that mean achievement score of experimental group is higher than that of control group. Hence Null Hypothesis is rejected.





\*\*\*\*\*  
CHAPTER - V  
SUMMARY  
\*\*\*\*\*



## 5.0.0

INTRODUCTION:

In the earlier chapters, the details related to various aspects of this study have been discussed. In this chapter the study is presented in brief.

Reviewing various studies in the area of conceptual learning. Gregory (1981) Ettayab (1981) Clance (1980) Prapradee (1980) Shirlug (1980) - Anthony Shovdon (1980) Tenner (1980) Josephe (1980) and Eenneth (1981), one may say that (a) Attainment of science concept were negligibly studied, (b) Sample used for these studies were mostly from college level; (c) Findings of these studies did not indicate any definite trend and (d) It is not clear whether these studies were conducted following the guidelines developed by Bruce-Joyce and Weil (1980).

Keeping all these points in mind, it was felt that there is need to conduct a study to test the effectiveness of CAM upon attainment of science concepts by Middle children. The present study is a step in this direction.

## 5.1.0

THE PRESENT STUDY :

The present study deals with the effectiveness of concept Attainment Model (CAM) in terms of pupils achievement. The effectiveness of the CAM was tested through the following question.:





What is the effect of the CAM on pupils achievement ?

5.2.0 OBJECTIVE :

"To findout the effectiveness of CAM in terms of concept attainment of student".

5.3.0 HYPOTHESIS :

On the basis of above objective the following hypothesis was formed :

There will be no significant difference between the mean achievement scores of the science student taught through CAM vis-a-vis traditional method.

5.4.0 METHOD AND PROCEDURE :

Procedure :

The present study was conducted in two stages :

a) Acquiring Mastery over the CAM, (b) Studying the effectiveness of CAM in terms of pupil attainment of science concepts. The procedure regarding mastery of CAM involves namely : Theoretical understanding of Reception concept Attainment Model and Developing lesson plans according to lesson plan guide (LPG).

The second stage of the study involves the final experiment having (1) Design (2) Sample (3) Tools (4) Data Collection and (5) Statistical Analysis.



#### 5.4.2 DESIGN OF THE STUDY :

The second stage of study aimed at findings out of the effectiveness of CAM for this purpose Post Test Parallel Group Design was used. The two groups, namely Experimental and Control groups were formulated. The experimental group was picked up from one school and the Control group was picked up from the other school. The treatment was assigned randomly.

#### 5.4.3 SAMPLE :

The sample of the present study consisted of seventy school children. They are from two different schools of Rohtak City. These Schools were :

1. SHIVA PUBLIC SCHOOL (SPS), ROHTAK
2. VAISH PUBLIC SCHOOL (VPS), ROHTAK

The treatment was assigned randomly. Accordingly group of students from 'SHIVA PUBLIC SCHOOL' was termed as Experimental group and students of (VAISH PUBLIC SCHOOL' was called control group.

#### 5.4.4 TOOLS :

One tool, namely, Attainment Test for selected science concept (ATSC) was prepared. The ATSC consisted of forty items; thirty eight of multiple choice type and two are short answer type. These items represented various elements of different



concepts.

#### 5.4.5 DATA COLLECTION :

The procedure followed in the data collection was completed under the following steps :

- a) Creating awareness about the CAM,
- b) In order to explain, the phases of the CAM a lesson was demonstrated.
- c) For strengthening learning about the CAM a demonstration lesson with thorough explanation was given.
- d) Eight lessons were taught through the CAM.
- e) The ATSC were administered to the concerned groups.

#### 5.5.0 FINDINGS :

On the basis of the analysis of the results, Hypothesis was rejected. The finding can be summarised as follows :

Overall mean performance, on ATSC of the Experimental group is significantly higher than that of the Control Group.

#### 5.6.0 IMPLICATION :

Results of the present study are positive, that is the CAM is an effective method for teaching science



concepts. Based upon these results, the following implication can be made :

- i) Preservice and Inservice teachers may be trained according to the CAM.
- ii) Science concepts of higher classes as well as lower classes may also be taught through the CAM.
- iii) Plenty of lesson plans of different subjects may be planned according to the CAM, so that this method gets further validation.
- iv) Efficient teacher educators may also be made available at different places of orientation to strengthen training colleges.





### 5.7.0 SUGGESTION :

Based upon this study the following suggestions are made :-

- i) There is need to study the attainment of relational and disjunctive types of concepts.
- ii) The available training package may be translated in Regional Languages and its effectiveness be studied upon.
- iii) Other dependent measures, such as, conceptual level, thinking pattern, specific criterion out comes, Feasibility of model at school and college level, may also be studied.
- iv) Other variation of the CAM, namely selection CAM, and unorganized material model may also be studied in similar ways.
- v) Adaptation of model as one of the component of training package could not be considered in the present study due to shortage of time. Continuous research may be conducted.
- vi) A follow-up research is needed to find out to what extent, the new method of attaining the concept helps to sustain these concepts.

\*\*\*\*\*



\*\*\*\*\*  
\* B I B L I O G R A P H Y \*  
\*\*\*\*\*



# B I B L I O G R A P H Y

<u>S.NO.</u>	<u>AUTHOR</u>	<u>BOOKS</u>
1	ANTHONY	DISSERTATION INTERNATIONAL ABSTRACT UMV MICROFILM INTERNATIONAL- DISSERTATION. VOL. 41 NO.3, SEPTEMBER, 1980 PAGE NO. 987 - A.
2	ALDON F.	DISSERTATION INTERNATIONAL ABSTRACT UMV MICROFILM INTERNATIONAL DISSERTATION. VOL 41 NO. 08 FEBRUARY,1981
3.	BRUNER J.S.	THE PROCESS OF EDUCATION ATMARAM AND SONS, DELHI - 5, 1964.
4	BUCH M.B.	SECOND SURVEY OF RESEARCH IN EDUCATION. SOCIETY FOR EDUCATIONAL RESEARCH AND DEVELOPMENT BORODA, INDIA.
5	BUCH M.B.	A SURVEY OF RESEARCH IN EDUCATION CENTRE OF ADVANCED STUDY IN EDUCATION, FACULTY OF EDUCATION AND PSYCHOLOGY. M.S. UNIVERSITY OF BARODA, BARODA, INDIA, 1974.



<u>S.NO.</u>	<u>AUTHOR</u>	<u>BOOKS</u>
6	U CHARLES	DISSERTATION INTERNATIONAL ABSTRACT UNV MICROFILM INTERNATIONAL DISSERATATION. VOL-42, NO. 02 AUGUST 1981, PAGE NO. 620-A
7	CLANCE	DISSERTATION INTERNATIONAL ABSTRACT UNIV MICROFILM INTERNATIONAL DISSERTATION VOL-41, NO. 11 . MAY - 1981.
8	DANDEKAR W.N.	THE PSYCHOLOGICAL FOUNDATIONS OF EDUCATION - 1976, DELHI, THE MACHILAN COMPANY OF INDIA LTD.
9	DALEN VAN B.	UNDERSTANDING EDUCATIONAL RESEARCH FOURTH EDITION, MC GRAW-HILL BOOK COMPANY.
10	EBEL L.R.	ENCYCLOPEDIA OF EDUCATIONAL RESEARCH, FOURTH EDITION, 1969.
11.	EDWARD	DISSERTATION INTERNATIONAL ABSTRACT UNV MICROFILM INTERNATIONAL COPIES VOL.42, NO. 02, AUGUST, 1981.
12.	EGGEN P. KAUCHAK D.	STRATEGIES FOR TEACHERS FRENTILE-HALL, INC. ENGLENOOD- LDIFFS, NEW JERSEY, 1979 P. 142 - 189.





<u>S.NO.</u>	<u>AUTHOR</u>	<u>BOOKS</u>
13	EPSTAIN	DISSERTATION INTERNATIONAL ABSTRACT UNV. MICROFILM INTERNATIONAL COPIES VOL. 42, NO. 02, AUGUST, 1981. PAGE NO. 611 - A.
14.	ETAYAB	DISSERTATION INTERNATIONAL ABSTRACT UNV MICROFILM INTERNATIONAL DISSERTATION, VOL - 42, NO. 04 OCTOBER, 1981, PAGE NO. 1148-A.
15	GOOD C.V.	DICTIONARY OF EDUCATION MC GROW-HILL BOOK COMPANY, THIRD EDITION - 1973.
16	GUILFORD J.P.	PSYCHOMETRIC METHODS TATA MC GROW-HILL PUBLICATION, NEW DELHI - 1971.
17	HARRIS W.C.	ENCYCLOPEDIA OF EDUCATIONAL RESEARCH THIRD EDITION, 1960.
18	HEERT	DISSERTATION INTERNATIONAL ABSTRACT UNV. MICROFILM INTERNATIONAL DISSERTATION VOL.-40, NO. 7, JANUARY , 1980 3915-A.
19	HOVDEN	DISSERTATION INTERNATIONAL ABSTRACT UNV MICROFILM INTERNATIONAL DISSERTATION VOL. 41, NO. 5, PAGE - 1993-A, NOVEMBER, 1980.



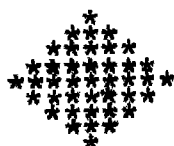
<u>S.NO.</u>	<u>AUTHOR</u>	<u>BOOKS</u>
20	IDM J.	DISSERTATION INTERNATIONAL ABSTRACT UNV MICROFILM INTERNATIONAL DISSERTATION, VOL. 42, NO. 06 DECEMBER, 1981.
21	JAMES	DISSERTATION INTERNATIONAL ABSTRACT UNV MICROFILM INTERNATIONAL DISSERTATION VOL. NO. 40 FEBRUARY, 1980, PAGE NO. 4278-A.
22	JOHNSON M. DONALD.	SYSTEMATIC INTRODUCTION TO THE PSYCHOLOGY OF THINKING 1972, HARPAR AND ROW PUBLISHERS. NEW YORK.
23	JOSEPH	DISSERTATION INTERNATIONAL ABSTRACT UNV MICROFILM INTERNATIONAL DISSERTATION VOL. 40, NO. 10 APRIL, 1980, PAGES - 5221-A, 5628 - A.
24	JOYCE BRUCE & WEIL MARSHA	INFORMATION PROCESSING MODEL EXPANDING YOUR TEACHING REPERTEIRE 1978, PRINTED IN THE UNITED STATES OF AMERICA.
25	JOYCE BRUCE & WEIL MARSHA	MODELS OF TEACHING COLUMBIA UNIVERSITY TEACHERS COLLEGE 1972, BY PRINTICE HALL NEW JERSEY.



<u>S.NO.</u>	<u>AUTHOR</u>	<u>BOOKS</u>
26	JOYCE BRUCE & WEIL MARSHA	MODELS OF TEACHING, SECOND EDITION 1985, PRINTICE HALL OF INDIA, PRIVATE LIMITED, NEW DELHI.
27	LIMDQUIST E.F.	STATISTICAL ANALYSIS IN EDUCATIONAL RESEARCH, OXFORD AND IBM PUBLISHING CO., 1970, NEW DELHI.
28	MAITO ALKA	DEVELOPMENT OF RECAPITALATION GAME FOR OBJECTIVE FORMULATION FOR TEACHER EDUCATORS, 1984 SADHNA MANDIR, INDORE.
29	MC. MENAR QUINN	PSYCHOLOGICAL STATISTICS, 1962 BY TOPPAN PRINTING COMPANY LTD.
30	HILLS	DISSERTATION INTERNATIONAL ABSTRACT UNV. MICROFILM INTERNATIONAL DISSERTATION.
31	MEHAR B.C. & MAYCOCK S.R.	EDUCATIONAL PSYCHOLOGY PITMAN PUBLISHING, 1966 BY THE COPPCLARK PUBLISHING COMPANY.
32	NING	DISSERTATION INTERNATIONAL ABSTRACT UNV. MICROFILM INTERNATIONAL- DISSERTATION VOL. 40, NO. 11, MAY, 1980, PAGE NO. 5706 - A



<u>S.NO.</u>	<u>AUTHOR</u>	<u>BOOKS</u>
33	BRAPVADE	DISSERTATION INTERNATIONAL ABSTRACT UNV. MICROFILM INTERNATIONAL DISSERTATION, VOL-41, NO. 11, MAY, 1981, PAGE NO. 4599.
34	RUTH A.	DISSERTATION INTERNATIONAL ABSTRACT UNV. MICROFILM INTERNATIONAL DISSERTATION VOL-40 <sup>m</sup> NO. 10 APRIL, 1979, PAGE-5221-A, 5628-A.
35	SHAMELA VIBHA	ADAPTION OF SELF INSTRUCTIONAL MICROTEACHING COURSE ON EFFECTIVE QUESTIONING SKILL AND STUDYING ITS EFFECTIVENESS, 1981 SADHNA MANDIR.
36	SHIRLAG	DISSERTATION INTERNATIONAL ABSTRACT UNV MICROFILM INTERNATIONAL- DISSERTATION VOL-41, NO. 2 AUGUST - 1980, PAGE NO. 604-A.
37	NYDER/HELEN	CONTEMPORARY EDUCATIONAL PSYCHOLOGY, 1968, JOHN WELIG AND SONS/NEWYORK 181 - 189.
38	TENNER	DISSERTATION INTERNATIONAL ABSTRACT UNV. MICROFILM INTERNATIONAL DISSERTATION, VOL-40, NO. 9, MARCH, 1980, PAGE - 4985-A.
39	URDONG LAURENCE EDITOR	THE RANDOM HOUSE DICTIONARY OF THE ENGLISH LANGUAGE ALLIED PUBLISHERS PRIVATE LIMITED, NEW DELHI, BOMBAY.
40	HAJDT EDWIN BROWN W.	ESSENTIALS OF EDUCATIONAL EVALUATION, 1957, HOLT RINENARI AND WINSTON, AMERICA.







\*\*\*\*\*  
\*  
\* A P P E N D I X \*  
\*  
\*\*\*\*\*



पाठ योजना क्रमांक - ।

क संकल्पना का विश्लेषण:-

अ संकल्पना का नाम:-

अम्ल

अम्लों की पहचान

ब संकल्पना के आवश्यक गुण:-

१ अम्ल स्वाद में खट्टे होते हैं ।

२ अम्ल नंगे लिटमस को लाल कर देते हैं ।

३ अम्ल धातुओं के साथ क्रिया करके हाइड्रोजन गैस बनाते हैं ।

४ अम्ल कार्बोनेटों को विच्छेदित करके कार्बनडाइऑक्साइड गैस बनाते हैं ।

५ ये बेसी के साथ क्रिया करके लवण तथा पानी बनाते हैं ।

स संकल्पना के अनावश्यक गुण:-

१ अम्लों के प्रकार २ गंध ३ रंग

द संकल्पना की परिभाषा:-

वे रासायनिक पदार्थ जो जल में विभाजित होकर हाइड्रोजन आयन प्रदान उत्पन्न करते हैं अम्ल कहलाते हैं ।

ख संकल्पना का प्रकार:- संयोजक

ग व्यावहारिक उद्देश्य:-

अ छात्र इस नये संकल्पना को देखकर अम्ल के आवश्यक व सामान्य गुणों को समझ सकेंगे ।

ब छात्र इस नए संकल्पना को अपने शब्दों में परिभाषित कर सकेंगे ।

स छात्र इस पाठ में अनाम्योक्ति उदाहरणों के स्पष्ट रूप से पहचान सकेंगे ।

द उदाहरण:- अ "हृदय" उदाहरण का विवरण:-

१ विभिन्न प्रकार के फल - नींबू, अंतरा, सेब, इमली,

२ दही

३ सल्फ्यूरिक अम्ल, हाइड्रोक्लोरिक अम्ल, नाइट्रिक अम्ल ।

आ "नदी" उदाहरण का विवरण:-

१ केला

२ सोडियम हाइड्रोक्साइड

३ कैल्शियम हाइड्रोक्साइड

४ पानी

ब प्रस्तुतिकरण करने का तरीका :-



१।१ प्रदर्शन के द्वारा १२१ चित्रों के द्वारा

१।१ प्रश्न:- क्या पर्याप्त मात्रा में हाँ या नहीं के उदाहरण लिये हैं ?

उत्तर:- "हाँ" ।

प्रश्न:- ऐसे कितने "नहीं" उदाहरण हैं जिनमें एक भी आवश्यक गुण नहीं है ?

उत्तर:- "तबिन" ।

प्रश्न:- ऐसे कितने "नहीं" उदाहरण हैं जिनमें एक या एक से अधिक आवश्यक गुण हैं ?

उत्तर:- "एक" ।

१।२ प्रतिमान की अवस्था:-

१।१ प्रथम अवस्था : बच्चों आज हम एक खेल खेलेंगे इसमें मैं आपके सामने कुछ उदाहरण रखूँगी । आप को उदाहरण के आगे "हाँ" और "नहीं" लिखा हुआ मिलेगा ।

आप उन उदाहरणों में से गुणों के आधार पर "हाँ" उदाहरण और "नहीं" उदाहरण को छान कर लेंगे हम "हाँ" उदाहरण को अपने विचार में सम्मिलित करना, व संकल्पना बनानी है ।

१।२ द्वितीय अवस्था:- अध्यापिका बच्चों को अनामांकित उदाहरण प्रस्तुत करेगी उसके बाद छात्रों के स्वयं के उदाहरण उसी संकल्पना से सम्बन्धित हों, पूछेंगी ।

१।३ तृतीय अवस्था:- बच्चों से संकल्पना तक पहुँचने में किन-किन विचार प्रक्रिया का उपयोग किया उसके बारे में पूछेंगी । इसके लिए अध्यापिका पाठ को पुनः दोहराएँगी और प्रत्येक उदाहरण के लिए छात्रों ने कैसे सोचा है उसके बारे में पूछेंगी ।

१।४ प्रश्न जो कि छात्र स्वयं पूछेंगे:-

१।१ दही में कौन सा अम्ल होता है ?

१।२ नींबू, सेब, अमुर, में कौन सा अम्ल होता है ?

१।३ हाइड्रोक्लोरिक अम्ल के क्या उपयोग हैं ?

१।४ रंग बनाने व रेशम व विस्फोटक पदार्थ में किस प्रकार का अम्ल प्रयोग में आता है ?



1 क 1

संकल्पना का विश्लेषण:-

अ॥ संकल्पना का नाम:- हाइड्रोक्लोरिक अम्ल

ब॥ संकल्पना के आवश्यक गुण

1॥ हाइड्रोजन 2॥ क्लोरान 3॥ रंगहीन

4॥ दम घोटने वाली गन्ध 5॥ जल में घुलनशील

6॥ हवा से भारी 7॥ स्वाद में खट्टा

8. नाले लिटमस को लाल

स. संकल्पना के अनावश्यक गुण:-

1॥ पानी 2॥ अम्लों के प्रकार

3॥ लाल लिटमस में परिवर्तन

द॥ संकल्पना की परिभाषा:-

वह रासायनिक पदार्थ जो वियोजित होकर हाइड्रोजन आयन एवं क्लोराईड आयन देता है। इसका रासायनिक सूत्र हाइड्रोजन क्लोराईड

(HCl) है और इसे नमक का अम्ल भी कहते हैं।

ख॥ संकल्पना का प्रकार :- संयोजक

ग॥ व्यवहारिक उद्देश्य:-

अ॥ छात्र इस नए संकल्पना को देखकर हाइड्रोक्लोरिक अम्ल को आवश्यक गुणों द्वारा समझ सकेंगे।

ब॥ छात्र इस नए संकल्पना को अपने शब्दों में परिभाषित कर सकेंगे।

स॥ छात्र इस पाठ में अनामंकित उदाहरण को स्पष्ट रूप से पहचान सकेंगे।

घ॥ उदाहरण:- अ॥ हों उदाहरण का विवरण:-

1॥ पानी 2. क्लोरोफॉम 3. अमोनियम क्लोराईड





अ० १ नही उदाहरण का विवरण:-

११ मीथेन

२१ मीथेन पलोराईड

३१ सोडियम हाईड्रोक्साईड

४१ कैल्शियम कार्बोनेट

५१ प्रस्तुतिकरण करने का तरीका:-

प्रदर्शन के द्वारा

६१ प्रश्न:- क्या पर्याप्त मात्रा में "हाँ" या नहीं के उदाहरण लिए हैं ?  
उत्तर: हाँ ।

प्रश्न:- ऐसे कितने नहीं उदाहरण हैं जिनमें एक भी आवश्यक गुण नहीं है ।

उत्तर: दो ।

प्रश्न:- ऐसे कितने "नहीं" उदाहरण हैं जिनमें एक या एक से अधिक  
आवश्यक गुण हैं ।

उत्तर:- दो

७१ प्रतिमान की अवस्था:-

११ प्रथम अवस्था:- बच्चों आज हम एक खेल खेलेंगे इसमें मैं आपके सामने कुछ उदाहरण रखूंगी । आपको उदाहरण के आगे हाँ और नहीं लिखा हुआ मिलेगा । आप इन उदाहरण में से गुणों के आधार पर हाँ उदाहरण और नहीं उदाहरण को अलग करते हुये हाँ उदाहरण को अपने विचार में सम्मिलित करना, व संकल्पना बनानी है ।

२१ द्वितीय अवस्था:- अध्यापिका बच्चों को अनामांकित उदाहरण प्रस्तुत करेंगी उसके बाद छात्रों के स्वयं के उदाहरण उसी संकल्पना से सम्बन्धित हों, पूछेंगी ।



3. तृतीय अवस्था :- बच्चों से संकल्पना तक पहुंचने में किन किन विचार

प्रक्रिया का उपयोग किया उसके बारे में पूछेंगी । इसके लिये

अध्यापिका पाठ को पुनः दोहरायेंगी और प्रत्येक उदाहरण के लिये

छात्रों ने कैसे सोचा है उसके बारे में पूछेंगी ।

4. प्रश्न जो कि छात्र सवय पूछेंगे :-

1. हाइड्रोक्लोरिक अम्ल कैसे बनाया जाता है ।

2. क्या हाइड्रोक्लोरिक अम्ल मिथाईल औरन्ज रंग को बदल देता है .9

3. हाइड्रोक्लोरिक अम्ल के क्या उपयोग है ।



पाठ योजना क्रमांक - 3

क. संकल्पना का विश्लेषण:-

अ. संकल्पना का नाम:- सल्फ्यूरिक अम्ल की परिभाषा व गुण

ब. संकल्पना के आवश्यक गुण:-

1. हाईड्रोजन 2. सल्फेट 3. स्वादि में छुट्टा

4. तोखी गन्ध 5. रंगहीन 6. नीले लिटमस को लाल

स. संकल्पना के अनावश्यक गुण:-

1. पानी 2. अम्लों के प्रकार

3. लिटमस में परिवर्तन

4. बेस

द. संकल्पना की परिभाषा:-

वह रासायनिक पदार्थ जो हाईड्रोजन आयन एवं सल्फेट आयन देता है इस का रासायनिक सूत्र  $H_2SO_4$  और इसे गन्धक का अम्ल भी कहते हैं ।

छ. संकल्पना का प्रकार:- संयोजन

ग. व्यावहारिक उद्देश्य:-

अ. छात्र इस नये संकल्पना को देखकर सल्फ्यूरिक अम्ल के आवश्यक गुणों को समझ सकेंगे ।

ब. छात्र इस संकल्पना के दैनिक जीवन में क्या उपयोग है जान सकेंगे ।

स. छात्र इस नए संकल्पना को अपने शब्दों में परिभाषित कर सकेंगे ।

द. छात्र इस पाठ में अनामंकित उदाहरण को स्पष्ट रूप से पहचान सकेंगे ।



जहाँ उदाहरण हैं वहीं उदाहरण का विवरण:-

1. जिप्सम  $\text{CaSO}_4 \cdot 2\text{H}_2\text{O}$

2. ओलिवम  $\text{H}_2\text{S}_2\text{O}_7$

3. कॉपर सल्फेट

4. सोडियम हाइड्रोजन सल्फेट

अहाँ उदाहरण का विवरण

1. अमोनियम बाइकार्बोनेट

2. पानी

3. सोडियम क्लोराइड

4. कैल्शियम हाइड्रोजेनसल्फेट

5. हाइड्रोजेन क्लोरिक अम्ल

6. धातु

7. प्रस्तुतिकरण करने का तरीका

1. प्रदर्शन के द्वारा 2. चित्रों के द्वारा

प्रश्न:- क्या पर्याप्त मात्रा में हैं या नहीं के उदाहरण लिए हैं  
उत्तर हैं।

प्रश्न:- ऐसे कितने नहीं उदाहरण हैं जिनमें एक भी आवश्यक गुण नहीं है

उत्तर: तीन

प्रश्न:- ऐसे कितने नहीं उदाहरण हैं जिनमें एक या एक से अधिक आवश्यक  
गुण हैं।

उत्तर: तीन

इ. प्रतिमान की अवस्था

1. प्रथम अवस्था:- बच्चों आज भी हम एक खेल खेलेंगे इसमें आपके





तास्ते एों और नहीं से नामांकित उदाहरण प्रस्तुत करेंगी ।

आप गुणों के आधार पर "हां" उदाहरण और "नहीं" उदाहरण को जान जान करते हुए हां उदाहरण को अपने विचार में सम्मिलित करिए व उसमें उपस्थित आवश्यक गुणों के आधार पर संकल्पना कराएँ ।

2. प्रथम अवस्था :- अध्यापिका बच्चों को अनामांकित उदाहरण प्रस्तुत करेंगी उसे बाद छात्रों के स्वयं के उदाहरण उसी संकल्पना से सम्मिलित एों, पूछेंगी ।

3. द्वितीय अवस्था :- बच्चों से संकल्पना तक पहुँचने में किन किन विचार प्रक्रिया का उपयोग किया उसके बारे में पूछेंगी इसके लिये अध्यापिका पाठ को पुनः दोहराएँगी और प्रत्येक उदाहरण के लिये छात्रों से सही सही है उसके बारे में पूछेंगी ।

4. प्रश्न जो कि छात्र पूछेंगे

1. क्या तत्त्वधूरिक अम्ल का कोई रंग होता है
2. क्या तत्त्वधूरिक अम्ल पानी में घुलनशील है ।
3. तत्त्वधूरिक अम्ल को गन्धक का अम्ल क्यों कहते हैं ।
4. क्या तत्त्वधूरिक अम्ल प्रकाश के प्रति क्रियाशील है
5. तत्त्वधूरिक अम्ल के क्या उपयोग हैं ।



## पाठ योजना क्रमांक 4

क० संकल्पना का विश्लेषण

अ० संकल्पना का नामः नाइट्रिक अम्ल परिभाषा  
गुण

घ० संकल्पना के आवश्यक गुण

1 x हाईड्रोजन 2० नाइट्रेट 3० गन्धहीन

4० रंग पीला/स्वाद में खट्टा 6० नीले लिटमस को लाल

सं० संकल्पना के अनावश्यक गुण

1० पानी 2० अम्लों के प्रकार

3० वायु 4० लाल लिटमस में परिवर्तन

घ० संकल्पना की परिभाषा

वह रासायनिक पदार्थ जो जल में वियोजित होकर हाईड्रोजन आयन एवं नाइट्रेट आयन देता है इसका रासायनिक सूत्र  $\text{HNO}_3$  और इसे शोरे का अम्ल भी कहते हैं ।

हा० संकल्पना का प्रकार:- संयोजक

ग। व्यवहारिक उद्देश्य:-

अ० छात्र इस नए संकल्पना को अपने शब्दों में परिभाषित कर सकेंगे ।

ब० छात्र स्पष्टतः व सही रूप से अनामांकित उदाहरणों की पहचान सकेंगे ।

स० प्रत्येक छात्र तीन नये उदाहरण बना सकेंगे ।

द० प्रत्येक छात्र अपनी पाठ्य पुस्तक में से संकल्पना के तीन उदाहरण , इन उदाहरणों के अलावा पहचान सकेंगे ।



च॥ उदाहरण आ "हाँ" उदाहरण का विवरण

1॥ प्लास्टिक

2॥ खाद

3॥ नाइट्रस अम्ल

आ॥ नहीं उदाहरण का विवरण

1॥ तिलचर नाईट्रेट

2 कैल्शियम कार्बोनेट

3॥ पान।

4॥ अमोनियम प्लोराईड

5 प्रस्तुतिकरण करने का तरीका प्रदर्शन के द्वारा

ई॥ प्रश्न : क्या पर्याप्त मात्रा में हाँ या नहीं के उदाहरण लिये है

उत्तर : हाँ

प्रश्न : ऐसे कितने नहीं उदाहरण है जिनमें एक भी आवश्यक गुण नहीं है

उत्तर : तीन

प्रश्न : ऐसे कितने "नहीं" उदाहरण है जिनमें एक या एक से अधिक

आवश्यक गुण है ।

उत्तर : एक

इ॥ प्रतिमान की अवस्था

1॥ प्रथम अवस्था :- बच्चों आजहम एक खेल खेलेंगे मैं आपके सामने

कुछ उदाहरण रखूंगी । आपको उदाहरण के आगे हाँ और नहीं

लिखा हुआ मिलेगा । आप इन उदाहरण में से गुणों के आधार

पर "हाँ" उदाहरण और "नहीं" उदाहरण को अलग करते हुये हाँ

उदाहरण को अपने विचार में सम्मिलित करना, व संकल्पना बनानी है।



2१ द्वितीय अवस्था :- अध्यापिका बच्चों को अनामांकित उदाहरण प्रस्तुत करेंगी उसके बाद छात्रों के स्वयं के उदाहरण उसी संकल्पना से सम्बन्धित हो, पूछेंगी ।

3 द्वितीय अवस्था :- बच्चों से संकल्पना तक पहुँचने में किन किन विचार प्रक्रिया का उपयोग किया उसके बारे में पूछेंगी । इसके लिये अध्यापिका पाठ को पुनः दोहरायेंगी और, प्रत्येक उदाहरण के लिये छात्रों ने कैसे सोचा है उसके बारे में पूछेंगी ।

प्रश्न जो कि छात्र स्वयं पूछेंगे :-

1. नार्ड्रिक अम्ल को शीरे का अम्ल क्यों कहते हैं
2. नार्ड्रिक अम्ल को प्रयोग में लाने के लिये क्या क्या सावधानियाँ धरतनी चाहिये
3. नार्ड्रिक अम्ल के तवचा पर पड़ने से क्या होता है ।
4. नार्ड्रिक अम्ल के क्या उपयोग है ।





## पाठ योजना क्रमांक - 5

क० संकल्पना का विश्लेषण:

अ० संकल्पना कानामः क्षारक

परिभाषा

क्षारक की पहचान

ब० संकल्पना के आवश्यक गुण:-

1. इन का स्वाद कड़वा होता है ।

2. ये साबुज जैसे बिकने होते हैं और त्वचा को क्षति पहुँचाते हैं ।

3. ये लाल लिटमस को नीला कर देते हैं ।

4. ये हल्दी के रंग को भूरा लाल कर देते हैं ।

स० संकल्पना के अनावश्यक गुण:-

1. क्षारक के प्रकार

2. गन्ध

3. रंग

द० संकल्पना की परिभाषा

वे रासायनिक पदार्थ जो जल में वियोजित होकर हाइड्रॉक्साइड

के  $\text{OH}^-$  के ऋण आयन उत्पन्न करते हैं क्षारक कहलाते हैं जैसे:-



छ० संकल्पना का प्रकार:- संयोजक

ग० व्यावहारिक उद्देश्य

अ० छात्र इस नए संकल्पना को देखकर क्षारक या बेस के सामान्य

व आवश्यक गुणों को समझ सकेंगे ।

ब० छात्र इस नए संकल्पना को अपने शब्दों में परिभाषित कर सकेंगे



सं० छात्र इस पाठ में अनामांकित उदाहरण को स्पष्ट रूप से पहचान सकेंगे ।

द० छात्र दैनिक जीवन में प्रयोग होने वाले क्षारक व बेस को पहचान सकेंगे ।

घ० उदाहरण:- अ "हाँ" उदाहरण का विवरण

1. फौजियम हाईड्रोक्साईड

2. सोडियम हाईड्रोक्साईड

3. पोटेशियम हाईड्रोक्साईड

4. बेकिंग पाउडर

5. कपड़े धोने का सोडा

आ० नहीं उदाहरण का विवरण

1. गुल्मा

2. कपड़े धोने का सोडा

3. फिटकरी

4. पोटेशियम नाइट्रेट

5. साबुन

द० प्रस्तुतिकरण का तरीका:-

अ० प्रदर्शन के द्वारा 2. चित्रों के द्वारा

घ० प्रश्न, क्या पर्याप्त मात्रा में हाँ और नहीं के उदाहरण लिए हैं

उत्तर हाँ

प्रश्न : ऐसे कितने नहीं उदाहरण हैं जिसमें एक भी आवश्यक गुण नहीं है

उत्तर एक

प्रश्न : ऐसे कितने नहीं उदाहरण हैं जिसमें एक या एक से अधिक आवश्यक गुण हैं



उत्तर

एक

प्र. नः ऐसे कितने "नहीं" उदाहरण है जिसमें एक या एक से अधिक आवश्यक गुण है ।

उत्तर तीन

१६ प्रतिमान की अवस्था :-

१६ प्रथम अवस्था :- बच्चों आज हम एक खेल खेलेंगे इसमें मैं आपके सामने कुछ उदाहरण रखूँगी । आप गुणों के आधार पर "हाँ" उदाहरण और "नहीं" उदाहरण को अलग अलग करते हुए "हाँ" उदाहरण को अपने विचार में सम्मिलित करेंगे और उसमें उपस्थित आवश्यक गुणों के आधार पर संकल्पना बनाईये ।

२१ विजातीय अवस्था :-

अध्यापिका बच्चों को अनामांकित उदाहरण प्रस्तुत करेंगी उसके बाद छात्रों के स्वयं के उदाहरण उसी संकल्पना से सम्बन्धित हो पौँँगी ।

३६ तृतीय अवस्था :- बच्चों से संकल्पना तक पहुँचने में किन-किन विचार प्रक्रिया का उपयोग किया उसके बारे में पूँँगी । इसके लिये अध्यापिका पाठ को पुनः दोहरायेगी और प्रत्येक उदाहरण के लिये छात्रों ने कैसे सोचा है उसके बारे में पूँँगी ।

४६ प्रश्न जो कि छात्र पूँँगे :-

११ क्या क्षार पानी में घुलने है ।

२६ क्या सभी क्षारक हल्के के रंग को लाल भूरा कर देते है ।

३१ क्या सभी क्षारक साबुन जैसे बिकने होते है ?



## पाठ योजना क्रमांक : 6

क. संकल्पना का नाम सोडियम हाइड्रॉक्साइड

अ. संकल्पना के आवश्यक गुण:-

1. चिकने

2. स्वाद में कड़वे

3. धूलनशील

4. गन्नाहीन

5. लाल लिटमस को नीला कर देते हैं ।

घ. संकल्पना के अनावश्यक गुण:-

1. पानी

2. द्रवों के प्रकार

3. पदार्थ की अवस्था

द. संकल्पना की परिभाषा:

वे रासायनिक पदार्थ जो हाइड्रॉक्साइड आयन  $\text{OH}^-$  रखें

ए.  $\text{NaOH}$  सोडियम । आयन देता है । इसका रासायनिक सूत्र  $\text{NaOH}$  है । और उसे कास्टिक सोडा भी कहते हैं ।

ख. संकल्पना का प्रकार:- संयोजक

ग. व्यावहारिक उद्देश्य

1. छात्र स्पष्टतः व सही रूप से अनामांकित उदाहरण को पहचान सकेंगे ।

2. प्रत्येक छात्र तीन नये उदाहरण बना सकेंगे ।

3. प्रत्येक छात्र अपनी पाठ्य पुस्तक में से संकल्पना के तीन उदाहरण इन उदाहरण के अलावा पहचान सकेंगे ।

4. छात्र संकल्पना के उदाहरण को देखेंगे और आवश्यक गुणों





के मूल्यों को वर्णन कर उन्हें नरसकल्पना में उपयोग कर सकेंगे ।

5. उक्त संकल्पना को परिभाषित करने में समर्थ होंगे ।

41. उदाहरण अ "हां" उदाहरण का विवरण ।

1. वायु

2. साबुन

3. प्लास्टिक

आ. "नहीं" उदाहरण का विवरण

1. हाईप्रोक्लोरिक अम्ल

2. फिटकरी

3. पेटेसियम नाइट्रेट

4. मोठा सोडा ।

5. घुना

6. प्रस्तुतिकरण करने का तरीका :-

प्रदर्शन के द्वारा

7. प्रश्न :- क्या पर्याप्त मात्रा में हां या नहीं के उदाहरण लिये है ।

उत्तर हां

प्रश्न :- ऐसे कितने "नहीं" उदाहरण है जिन में एक भी आवश्यक गुण नहीं है?

उत्तर चार

प्रश्न : ऐसे कितने नहीं उदाहरण है जिनमें एक या एक से अधिक आवश्यक गुण है ।

उत्तर एक

8. प्रतिमान की अवस्था



1. प्रथम अवस्था:- बच्चों आज हम एक खेल खेलेंगे इसमें मैं आपके सामने कुछ उदाहरण प्रस्तुत करूंगी। आपको उदाहरण के आगे हाँ और नहीं लिखा हुआ मिलेगा। आप उन उदाहरणों में से गुणों के आधार पर "हाँ" उदाहरण और "नहीं" उदाहरण को अलग करते हुये "हाँ" उदाहरण को अपने विचार में सम्मिलित करना, व संकल्पना बनाने है।
2. द्वितीय अवस्था:- अध्यापिका बच्चों को अनामांकि उदाहरण प्रस्तुत करेंगी उसके बाद छात्रों के स्वयं के उदाहरण उसी संकल्पना से सम्बन्धित हो पौछेंगी।
3. तृतीय अवस्था:- बच्चों से संकल्पना तक पहुँचने में किन किन विचार प्रक्रिया का उपयोग किया उसके बारे में पूछेंगी। इसके लिए अध्यापिका पाठ को पुनः दोहरावेंगी और प्रत्येक उदाहरण के लिए छात्रों ने कैसे सोचा है उसके बारे में पूछेंगी।
- च. प्रश्न जो कि छात्र स्वयं पूछेंगे:-
  1. सोडियम हाइड्रॉक्साइड का रासायनिक सूत्र क्या है।
  2. क्या सोडियम हाइड्रॉक्साइड पानी में घुलनशील है।
  3. क्या सोडियम हाइड्रॉक्साइड हल्दी के रंग को लाल भूरा कर देता है।
  4. क्या सोडियम हाइड्रॉक्साइड लाल लिटमस में परिवर्तन लाता है।



## पाठ योजना प्रमाँक - १७१

क. संकल्पना का विश्लेषण:

अ. संकल्पना का नाम:- लवण

ब. संकल्पना के आवश्यक गुण:-

१. अम्ल 2. क्षार

३. पानी 4. धातु

क. संकल्पना के अनावश्यक गुण:-

१. रंग 2. पदार्थ की अवस्था

३. जल व क्षार के प्रकार 4. रंग

द. संकल्पना की परिभाषा:-

वे रासायनिक पदार्थ जो अम्ल की बेस के साथ उदासीनीकरण अभिक्रिया द्वारा बनते हैं जैसे  $\text{NaOH} + \text{HCl} \rightarrow \text{NaCl} + \text{H}_2\text{O}$

नाइट्रिक सोडा || अम्ल || --- || सोडियम क्लोराईड || + पानी

ध. प्रमुख संकल्पना का प्रकार :- संयोजक

ग. व्यावहारिक उद्देश्य :

अ. छात्र इस नए संकल्पना को देखकर "लवण" के आवश्यक गुणों के द्वारा समझ सकेंगे ।

ब. छात्र इस नए संकल्पना को अपने शब्दों में परिभाषित कर सकेंगे ।

क. छात्र इस पाठ में अनामाँक उदाहरण को स्पष्ट रूप से पहचान सकेंगे ।



५१॥ उदाहरण ॥अ॥ "हा" उदाहरण का विवरण:-

- 1॥ साधारण नमक
- 2॥ कपड़े धोने का ~~सबुना~~ /सोडा
- 3॥ फिटकरी
- 4॥ पोटेशियम नाइट्रेट
- 5॥ मोठा सोडा

अ॥ "नहीं" उदाहरण का विवरण:-

- 1॥ सोडियम हाइड्रोक्साइड
- 2॥ हाइड्रोक्लोरिक अम्ल
- 3॥ पानी
- 4॥ घूना

६॥ प्रस्तुतिकरण का तरीका:-  
प्रदर्शन के द्वारा

७॥ प्रश्न: क्या पर्याप्त मात्रा में हा या नहीं के उदाहरण लिये है  
उत्तर: हाँ

प्रश्न: ऐसे कितने नहीं उदाहरण है जिनमें एक भी आवश्यक गुण नहीं है  
उत्तर: तीन

प्रश्न: ऐसे कितने नहीं उदाहरण है जिनमें एक या एक से अधिक  
आवश्यक गुण है ।

उत्तर: एक

वर्तमान की अवस्था

1॥ प्रथम अवस्था:- बच्चों आज हम एक खेल खेलेंगे इसमें मैं आपके





सामने कुछ उदाहरण रखूंगी । आपको उदाहरण के आगे "हां" और "नहीं" लिखा हुआ मिलेगा । आप उन उदाहरण में से गुणों के आधार पर "हां" उदाहरण और "नहीं" उदाहरण को अलग करते हुये हां उदाहरण को अपने विचार में सम्मिलित करना, व संकल्पना बनानी है ।

2॥ द्वितीय अवस्था :- अध्यापिका बच्चों को अनामांकि उदाहरण प्रस्तुत करेंगी उसके बाद छात्रों के स्वयं के उदाहरण उसी संकल्पना से सम्बन्धित हो पूछेंगी ।

3॥ तृतीय अवस्था :- बच्चों के संकल्पना तक पहुँचने में किन किन विचार प्रक्रिया का उपयोग किया उसके बारे में पूछेंगी । इसके लिए अध्यापिका पाठ को पुनः दोहरायेंगी और प्रत्येक उदाहरण के लिए छात्रों ने कैसे सोचा है उसके बारे में पूछेंगी ।

च॥ प्रश्न जो कि छात्र स्वयं पूछेंगे ।

1॥ हमारे दैनिक जीवन में कौन कौन से लवण उपयोग में आते हैं

2॥ लवण के भौतिक गुण कौन से हैं ।

3॥ क्या लवण भी लिटमस में परिवर्तन लाते हैं ।

4॥ क्या लवण भी धातुओं के साथ क्रिया करते हैं ।



## स्वीकृति संकल्पना प्राप्ति प्रादर्श उपलब्धि

### परीक्षण-पत्र

नाम पूरा

कक्षा

आयु

दिनांक

जाति

पिता का नाम

मासिक आय

पता :

समय : 40 मिनट

निर्देश १। नीचे दिए गए प्रश्नों के 3-4 सम्भावित उत्तर दिए गए हैं, उनमें से आप सही उत्तर को चुने और उसके सामने दिये गये वाक्य  में सही  का चिन्ह लगाना है

2. प्रत्येक प्रश्न को हल करने के लिये एक मिनट का समय दिया गया है। अगर आपको किसी प्रश्न का उत्तर नहीं आए तो आप निःसंकोच अगले प्रश्न पर पहुँच सकते हैं और अन्त में समय बचे तब आप उस प्रश्न का उत्तर सोच सकते हैं।

3. सुविधा व समझने की दृष्टि से एक उदाहरण नीचे दिया गया है :-

प्रश्न :- हमारे जीवित रहने के लिए कौन सी गैस आवश्यक होती है।

1. आक्सीजन गैस ☒

3. कार्बनडाइआक्साईड गैस ☐

2. नाइट्रोजन गैस ☐

4. हाइड्रोजन गैस ☐

उपरोक्त उदाहरण में नम्बर १। सही है कि जीवित रहने के लिए आक्सीजन गैस आवश्यक है। अतः सही का निशान आक्सीजन गैस के सामने वाले बाक्स में लगेगा।



1. अम्ल :-

क॥ लाल लिटमस को नीला कर देते हैं

ख॥ नीले लिटमस को लाल कर देते हैं ।

ग॥ लिटमस के प्रति उदासीन होते हैं

घ॥ लाल लिटमस को भूरा पीला कर देते हैं ।

2॥ अम्ल का अर्थ है :-

क॥ वे पदार्थ जो आक्सीजन आयन उत्पन्न करते हैं

ख॥ वे पदार्थ जो हाइड्रोजन आयन उत्पन्न करते हैं

ग॥ वे पदार्थ जो हाइड्रोजन आयन उत्पन्न करते हैं

घ॥ वे पदार्थ जो पानी उत्पन्न करते हैं

3॥ इनमें से अम्ल है

क॥ पानी

ख. सल्फ्यूरिक

ग॥ सोडियम हाइड्रॉक्साइड

घ॥ कैल्शियम

हाइड्रॉक्साइड

4. निम्नलिखित में से "अम्ल" के लिए कौन सा आवश्यक गुण है

क॥ पानी

ख॥ सोडियम हाइड्रॉक्साइड

ग॥ सल्फ्यूरिक अम्ल

घ॥ नाइट्रिक अम्ल



5. अम्ल स्वाद में:-

क. भीठे होते हैं

ख. खट्टे होते हैं

ग. कोई स्वाद नहीं होता है

घ. कड़वे होते हैं

6. अम्ल धातुओं के साथ क्रिया करके:-

क. हाइड्रोजन गैस बनाते हैं

ख. आक्सीजन गैस बनाते हैं

ग. कार्बनडाईऑक्साइड गैस बनाते हैं

घ. पानी बनाते हैं

7. हाइड्रोक्लोरिक अम्ल को:

क. शीरे का अम्ल भी कहते हैं

ख. गन्धक का अम्ल भी कहते हैं

ग. नमक का अम्ल भी कहते हैं

घ. चीनी का अम्ल भी कहते हैं





8. हाईड्रोक्लोरिक अम्ल का रासायनिक सूत्र

1.  $H_2SO_4$

2.  $HCl$

3.  $HNO_3$

4.  $HSC_4$

है।

9. कौन सा अम्ल प्रयोगशाला में अभिकारक के रूप में प्रयोग किया जाता है :

क. सल्फ्यूरिक अम्ल

ख. हाईड्रोक्लोरिक अम्ल

ग. नाइट्रिक अम्ल

घ. पानी

10.

1. विद्युत का सुघालक

2. कुचक

इस क्रिया में जैसे  $CaCO_3 + \text{अम्ल} = CaCl_2 + H_2O + CO_2$

कौन सा अम्ल प्रयोग करता है:-

क. सल्फ्यूरिक अम्ल

ख. हाईड्रोक्लोरिक अम्ल

ग. पानी

घ. नाइट्रिक अम्ल



11. सल्फ्यूरिक अम्ल का रासायनिक सूत्र:-

क)  $H_2SO_4$

ख)  $HNO_3$

ग)  $H_2CO_3$

घ)  $H_2O$

12. पानी में गन्धक का अम्ल मिलाने से -----उत्पन्न होती है ।

॥ उष्मा, रोशनी, दण्डक, गर्मी ॥

13. गन्धक के अम्ल के लिये अनावश्यक गुण है ।

क) नीले लिटमस को लाल करते है

ख) इस का रंग हल्का भूरा है

ग) इसकी गन्ध तीखी है

घ) पानी

14. गन्धक का अम्ल

क) लाल लिटमस को नीला कर देता है

ख) नीले लिटमस को लाल कर देता है

ग) उदासीन है

घ) लाल लिटमस को भूरा लाल कर देता है



15. शोरे का अम्ल भी इस अम्ल को कहते हैं ।

क) सल्फ्यूरिक अम्ल

ख) नाइट्रिक अम्ल

ग) पानी

घ) हाईड्रोक्लोरिक अम्ल

16. वायु में थोड़ी सी मात्रा में कौन सा अम्ल होता है ।

क)  $H_2SO_4$

ख)  $HNO_3$

ग)  $O_2$

घ)  $HCl$

17. नाइट्रिक अम्ल के कोई दो आवश्यक गुण लिखो ।

क) \_\_\_\_\_

ख) \_\_\_\_\_

18. नाइट्रिक अम्ल के कौन कौन से अनावश्यक गुण हैं कोई दो गुण लिखो

क) \_\_\_\_\_

ख) \_\_\_\_\_

19. यह  $ZnCO_3 + \text{-----} \rightarrow Zn(NO_3)_2 + H_2O + CO_2$

कौन सा अम्ल कार्बोनेट के साथ क्रिया करता है ।



1.  $\text{HNO}_3$
2.  $\text{H}_2\text{O}$
3.  $\text{H}_2\text{SO}_4$
4.  $\text{HCl}$

20. कौन से अम्ल के त्वचा पर लग जाने से पीले धब्बे बन जाते हैं ।

- क) सल्फ्यूरिक अम्ल
- ख) नाइट्रिक अम्ल
- ग) हाईड्रोक्लोरिक अम्ल
- घ) कैल्शियम हाईड्रोक्साईड

21. क्षार :-

- क) पत्थर जैसे कठोर होते हैं ।
- ख) साबुन जैसे चिकने होते हैं
- ग) न कठोर होते हैं न नरम
- घ) थोड़े से कठोर व थोड़े से नरम होते हैं

22. क्षार का अर्थ है :-

- क) वे पदार्थ जो हाईड्रोजन आयन उत्पन्न करते हैं
- ख) वे पदार्थ जो आयन आयन उत्पन्न करते हैं
- ग) वे पदार्थ जो हाईड्रोक्साईड आयन उत्पन्न करते हैं
- घ) वे पदार्थ जो पानी बनाते हैं





23. क्षार स्वाद में

क॥ मीठे होते हैं

ख॥ कड़वे होते हैं

ग॥ खदटे होते हैं

घ॥ कोई स्वाद नहीं होता

24. क्षार हल्दी के रंग को :-

क॥ हरा कर देते हैं

ख॥ भूरा लाल कर देते हैं

ग॥ लाल कर देते हैं

घ॥ कोई रंग नहीं बदलता

25. क्षार :-

क॥ लिटमस को प्रति उदासीन होते हैं

ख॥ नीले लिटमस को लाल कर देते हैं

ग॥ लाल लिटमस को नीला कर देते हैं

घ॥ दोनों लिटमस के साथ एक सा रंग देते हैं



26 . इनमें क्षार :-

क॥ सल्फ्यूरिक

ख॥ कैल्शियम हाइड्रॉक्साईड

ग॥ पानी

घ॥ चुना

27 . सोडियम हाइड्रॉक्साईड का रासायनिक सूत्र

क॥  $\text{NaOH}$

ख॥  $\text{KOH}$

ग॥  $\text{H}_2\text{O}$

घ॥  $\text{Ca}(\text{OH})_2$

28 . सोडियम हाइड्रॉक्साईड पानी में :-

क॥ तैरता रहता है

ख॥ शीघ्रता से घुल जाता है

ग॥ नहीं घुलता है

घ॥ कुछ कुछ घुल जाता है

29 . सोडियम हाइड्रॉक्साईड के दो आवश्यक गुण लिखो :-

क॥ \_\_\_\_\_

ख॥ \_\_\_\_\_



30. "नहाने के साबुन" बनाने में प्रयोग होता है ।

क॥ कैल्शियम हाईड्रॉक्साईड

ख॥ पोटेशियम हाईड्रॉक्साईड

ग॥ सोडियम हाईड्रॉक्साईड

घ॥ सल्फ्यूरिक अम्ल

31. कैल्शियम हाईड्रॉक्साईडरंग में :-

1. सफेद होता है ।

2. रंगहीन होता है

ग. भूरा रंग

घ. मिट्टी जैसा रंग

32. अम्ल बेस के साथ क्रिया करके बनाते है

क॥ लवण और पानी बनाते है

ख॥ हाईड्रोजन गैस उत्पन्न करते है

ग॥ कार्बनडाइऑक्साईड गैस उत्पन्न करते है

घ॥ पानी बनाते है



33. साधारण नमक किस का उदाहरण है ।

- क० अम्ल
- ख० क्षार
- ग० लवण
- घ० पानी

34. डबलरोटी बनाने में किस का प्रयोग किया जाता है ।

- क० मोठा सोडा
- ख० पोटेशियम नाइट्रेट
- ग० फिटकरी
- घ० साधारण नमक

35. सामान्य जीवन में उपयोग आने वाले कुछ लवणों के नाम बताओ

- क० \_\_\_\_\_ ख० \_\_\_\_\_
- ग० \_\_\_\_\_ घ० \_\_\_\_\_

36. पदार्थ "ए" पोटेशियम हाईड्राक्साईड और हाईड्रोक्लोरिक अम्ल की क्रिया से बना है इसका विलयन लिटमस के प्रति उदासीन है

पदार्थ "ए" क्या है :-

- क०  $KCl$
- ख०  $H_2O$
- ग०  $K_2SO_4$
- घ०  $NaCl$





37. निम्नलिखित आक्साइडों के आगे खाली स्थान पर लिखो कि ये किस प्रकार के आक्साइड हैं :-

क.  $\text{CO}_2$  -----

ख.  $\text{CO}$  -----

ग.  $\text{CaO}$  -----

घ.  $\text{O}_2$  -----

38. खाली स्थान भरों :-

क. -----आक्साइड केवल धातुओं से ही-----प्राप्त किए जा सकते हैं

ख. ----- अम्ल क्षार के साथ क्रिया करके लवण और पानी बनाते हैं

39. यहां पर कुछ लवण दिए जाते हैं उनके रासायनिक सूत्र लिखो ।

क. साधारण नमक

ख. मीठा सोडा

ग. कपड़े धोने का सोडा

घ. पोटेशियम नाइट्रेट



40. लक्ष्मणों का उपयोग हमारे दैनिक जीवन में बहुत होता है ।~~शब्द~~

कोई नार उपयोग लिखो :-

क

ख

ग

घ

